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Installing and Maintaining the Versalar Switch Router 15000

NORTEL NETWORKS™

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Preface

The Nortel Networks™ Versalar™ Switch Router 15000 is a next-generation Internet Protocol (IP) router designed to provide access, traffic management, and accounting information for over 1000 simultaneous IP sessions. Carrier Networking Services is the software for the Versalar Switch Router 15000.

This guide provides instructions for installing the Versalar 15000 for the first time or for replacing any Versalar 15000 customer-replaceable unit (CRU).

In this guide, the Versalar Switch Router 15000 is referred to as the "Versalar 15000."

Before You Begin

This guide is intended for qualified service personnel who are installing the Versalar 15000 for the first time or who need to install or replace any Versalar 15000 CRU. A qualified service person should have appropriate technical training and experience and be aware of the hazards involved in installing and replacing CRUs.

Caution: The Versalar 15000 is intended for use in a restricted access location.

Before installing the Versalar 15000, ensure that all network wiring has been installed on the premises using standard cable-system practices.

Before turning on the Versalar 15000 for the first time, contact your network administrator to determine which software configuration option to use.

Text Conventions

This guide uses the following text conventions:

bold text	Indicates command names and options and text that you need to enter. Example: Enter the **diags** command.
italic text	Indicates new terms, book titles, and variables in command syntax descriptions.

Acronyms

This guide uses the following acronyms:

AIS	alarm indication signal
AP	access processor
APS	automatic protection switching
ARM	access redundancy module
ASIC	application-specific integrated circuit
ATM	asynchronous transfer mode
ATP	ATM trunk processor
CAP	channelized access processor
CBR	constant bit rate
CRU	customer-replaceable unit
CTS	clear to send
DCD	data carrier detect
DIMM	dual inline memory module
DS3	digital service level 3
DSR	data set ready
DTR	data terminal ready

EIA	Electronic Industries Association
EMI	electromagnetic interference
GND	ground
IFP	Internet forwarding processor
IP	Internet Protocol
LED	light emitting diode
LOF	loss of frame
LOS	loss of signal
MMF	multimode fiber
NC	normally closed
NEMA	National Electrical Manufacturers Association
NO	normally open
OC-3	Optical Carrier-level 3
OC-12	Optical Carrier-level 12
POS	packet over sonet
RDI	remote defect indication
RFU	reserved for future use
RLSD	received line signal detection
RTS	ready to send
Rxd	receive data
SMF	single-mode fiber
SSP	system services processor
STM	synchronous transfer mode
TP	trunk processor
Txd	transmit
UBR	unspecified bit rate
UTP	unshielded twisted pair
VBR	variable bit rate

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Chapter 1
Versalar 15000 Hardware Description

This chapter introduces the Versalar Switch Router 15000 hardware and describes the light emitting diodes (LEDs) on each component. It includes the following topics:

Topic	Page
Versalar 15000 Components	1-2
Processor Cards	1-4
Interface Cards	1-24

Versalar 15000 Components

The Versalar 15000 consists of a chassis that contains slots for these modules:

- Processor cards (front of chassis)
  - -- Five access processor (AP) cards
  - -- Three Internet forwarding processor (IFP) cards
  - -- Two system services processor (SSP) cards
  - -- Two trunk processor (TP) cards
- Interface cards (rear of chassis)
  - -- For *redundant* configurations: four access interface cards and one access redundancy module (ARM) interface card
  - -- For *nonredundant* configurations: five access interface cards
  - -- One SSP interface Ethernet card
  - -- One SSP interface console card
  - -- Two trunk interface cards
- Two DC power modules
- One fan tray

Figure 1-1 shows the location of the Versalar 15000 customer-replaceable units (CRUs).

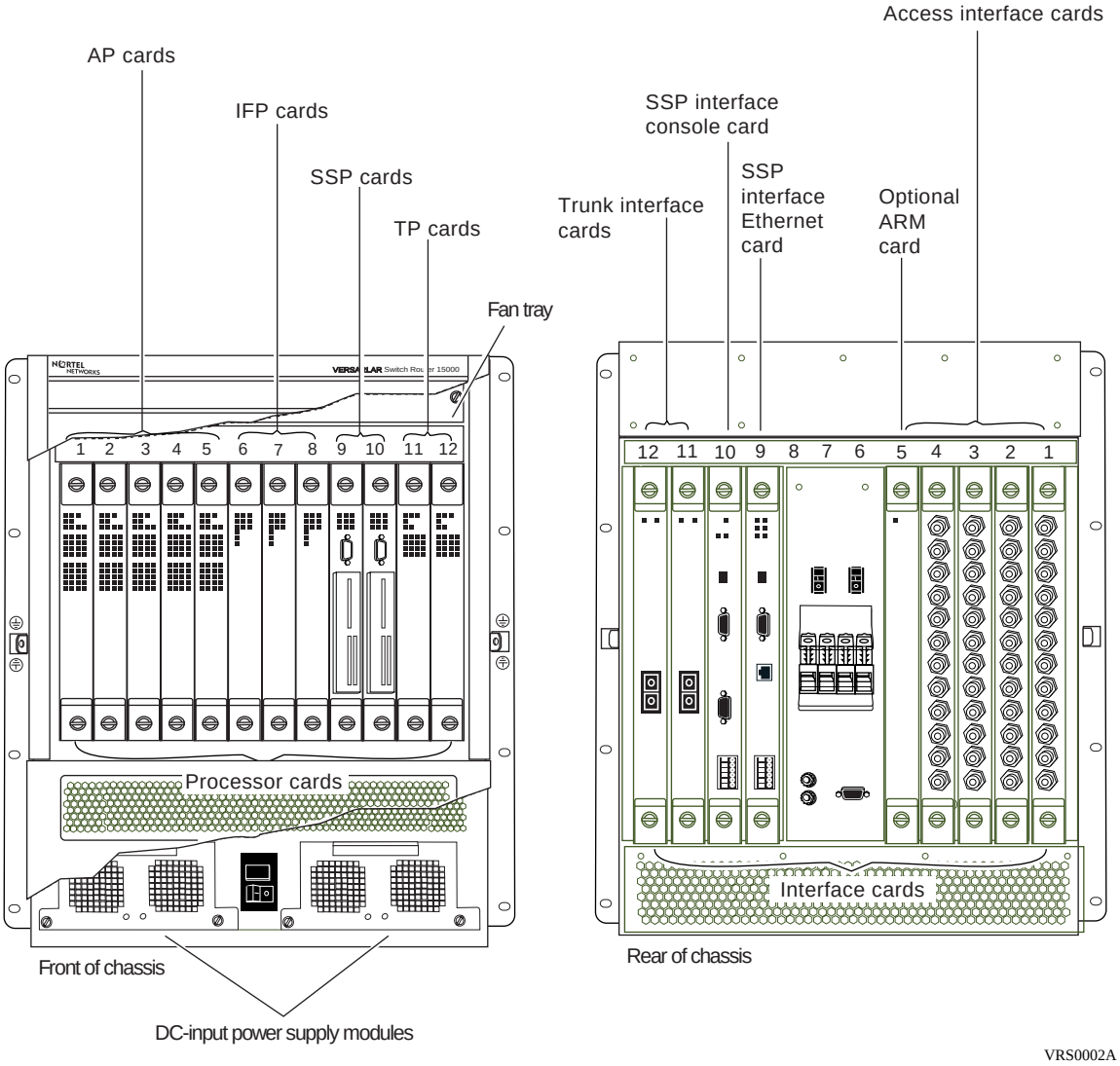


Figure 1-1. Location of the Customer-Replaceable Units

Processor Cards

In this guide, the term *processor card* refers to the following cards:

- Access processor (AP) card
- Internet forwarding processor (IFP) card
- System services processor (SSP) card
- Trunk processor (TP) card

The processor cards perform the network layer protocol processing on the data packets.

- AP and TP cards provide layer 2 processing.
- IFP cards provide layer 3 processing.
- SSP cards provide layer 4 and above processing.

Card Configuration Requirements

Table 1-1 shows possibilities for installing the cards into the card slots in the Versalar 15000.

Table 1-1. Installation Possibilities

AP Cards	TP Cards	Base Configuration	Performance Configuration	Redundant Configuration
1	0	1 AP card in slot 1 1 IFP card in slot 6 1 SSP card in slot 9	None	1 AP card in slot 5 1 IFP card in slot 8 1 SSP card in slot 10
2	0	2 AP cards in slots 1 and 2 1 IFP card in slot 6 1 SSP card in slot 9	None	1 AP card in slot 5 1 IFP card in slot 8 1 SSP card in slot 10
3	0	3 AP cards in slots 1, 2, and 3 2 IFP cards in slots 6 and 8 1 SSP card in slot 9	None	1 AP card in slot 5 1 IFP card in slot 7 1 SSP card in slot 10
4	0	4 AP cards in slots 1, 2, 3, and 4 2 IFP cards in slots 6 and 8 1 SSP card in slot 9	None	1 AP card in slot 5 1 IFP card in slot 7 1 SSP card in slot 10

(continued)

Table 1-1. Installation Possibilities *(continued)*

AP Cards	TP Cards	Base Configuration	Performance Configuration	Redundant Configuration
5	0	5 AP cards in slots 1, 2, 3, 4, and 5 3 IFP cards in slots 6, 7, and 8 1 SSP card in slot 9	None	N/A
1	1	1 AP card in slot 1 1 TP card in slot 11 1 IFP card in slot 6 1 SSP card in slot 9	None	1 AP card in slot 5 1 IFP card in slot 8 1 SSP card in slot 10
2	1	2 AP cards in slots 1 and 2 1 TP card in slot 11 1 IFP card in slot 6 1 SSP card in slot 9	1 IPF card in slot 8	1 AP card in slot 5 1 SSP card in slot 10
3	1	3 AP cards in slots 1, 2, and 3 1 TP card in slot 11 2 IFP cards in slots 6 and 8 1 SSP card in slot 9	None	1 AP card in slot 5 1 IFP card in slot 7 1 SSP card in slot 10
4	1	4 AP cards in slots 1, 2, 3, and 4 1 TP card in slot 11 2 IFP cards in slots 6 and 8 1 SSP card in slot 9	1 IFP card in slot 7	1 AP card in slot 5 1 SSP card in slot 10
5	1	5 AP cards in slots 1, 2, 3, 4, and 5 1 TP card in slot 11 3 IFP cards in slots 6, 7, and 8 1 SSP card in slot 9	None	N/A
1	2	1 AP card in slot 1 2 TP cards in slots 11 and 12 2 IFP cards in slots 6 and 8 1 SSP card in slot 9	None	1 AP card in slot 5 1 IFP card in slot 7 1 SSP card in slot 10
2	2	2 AP cards in slots 1 and 2 2 TP cards in slots 11 and 12 2 IFP cards in slots 6 and 8 1 SSP card in slot 9	None	1 AP card in slot 5 1 IFP card in slot 7 1 SSP card in slot 10
3	2	3 AP cards in slots 1, 2, and 3 2 TP cards in slots 11 and 12 2 IFP cards in slots 6 and 8 1 SSP card in slot 9	1 IFP card in slot 7	1 AP card in slot 5 1 SSP card in slot 10

(continued)

Table 1-1. Installation Possibilities *(continued)*

AP Cards	TP Cards	Base Configuration	Performance Configuration	Redundant Configuration
4	2	4 AP cards in slots 1, 2, 3, and 4 2 TP cards in slots 11 and 12 2 IFP cards in slots 6 and 8 1 SSP card in slot 9	1 IFP card in slot 7	1 AP card in slot 5 1 SSP card in slot 10
5	2	5 AP cards in slots 1, 2, 3, 4, and 5 2 TP cards in slots 11 and 12 3 IFP cards in slots 6, 7, and 8 1 SSP card in slot 9	None	N/A

Examples of Card Configuration

The performance configuration is additive from the base configuration. For example, to set up the performance configuration for four AP cards and two TP cards, add an IFP card in slot 7 to the base configuration. The resulting configuration is:

AP1, AP2, AP3, AP4, TP11, TP12, IFP6, IFP7, IFP8, SSP9

The redundant configuration is additive from the performance configuration. For example, to set up the redundant configuration for four AP cards and two TP cards, add an AP card in slot 5 and an SSP card in slot 10. The resulting configuration is:

AP1, AP2, AP3, AP4, AP5, TP11, TP12, IFP6, IFP7, IFP8, SSP9, SSP10

Access Processor Cards

The Versalar 15000 supports four AP cards in chassis slots 1 to 5.

Note: If you do not use all the slots from 1 to 5, use the lowest-numbered slots first.

Each AP card services the access interface card corresponding to the slot number of the installed AP card. For example, the AP card installed in processor card slot 2 services the access interface card installed in interface card slot 2.

Note: The function of a physical interface card in the rear of the chassis must match the function of the AP card in the corresponding slot in the front of the chassis, for example, ATM to ATM or T3 to T3.

An AP card installed in slot 5 can provide failover service to the AP cards in slots 1 to 4. For more information about redundancy, see "Access Redundancy Module Interface Card" on page 1-26.

The Versalar 15000 supports four types of AP cards:

- The M13 channelized access processor (CAP) card is used for subrate T1 and T1 applications.
- The DS3 CAP card provides high-speed access over DS3 lines.
- The hybrid M13 and clear-channel DS3 CAP card provides both T1 and high-speed access.
- The ATM (asynchronous transfer mode) access processor card provides ATM access via DS3 or OC-3 lines.

Each AP card consists of a printed circuit board, an EMI card shield, a bezel with status LEDs, and 2 captive screws to secure the card in place (Figure 1-2).

AP Card Labels

The AP cards are differentiated from each other by their labels only. Otherwise, the cards appear the same.

Table 1-2 lists the label identifiers for all types of AP cards.

Table 1-2. AP Card Labels

Card Type	Label
M13	CAP
Clear-channel DS3	CAP-DS3
Hybrid M13/clear DS3	CAP-M13/DS3
ATM access processor	AAP

Figure 1-2 shows an example of an M13/DS3 CAP card. All the AP cards are identical to this card. This illustration shows the card's unique label identifier as well as the position of the LEDs.

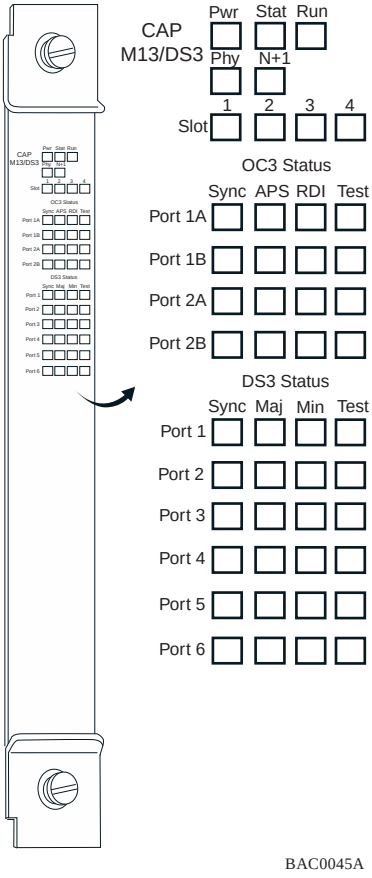


Figure 1-2. M13/DS3 CAP Card

AP Card LEDs

Table 1-3 describes the LEDs for all AP cards. This group of LEDs is the same for all the AP cards.

Table 1-3. AP Card LEDs

LED	State	Meaning
Pwr	Off	CAP card is turned off.
	On (green)	CAP card is turned on.
Stat	Off	LED is not functioning.
	On (green)	CAP card is operating normally.
	Flashing (green)	Power-up diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the module by cycling power, issuing the **diags** command from the Bay Command Console (BCC™), or installing the CAP card with the power on.
	On (amber)	Diagnostic testing failed. The CAP card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.
Run	Off	The processor code is not loaded.
	On (green)	The processor code loaded successfully.
	Flashing (green)	The processor code is loading.
	On (amber)	A failure was detected.
Phy	Off	No interface card is installed in the interface card slot corresponding to this CAP card.
	On (green)	A T3 or ARM interface card is present in the interface card slot corresponding to this CAP card.
N+1	Off	N+1 failover operation is not engaged.
	On (green)	N+1 failover operation is engaged; that is: • CAP card is present in processor card slot 5. • ARM card is present in interface card slot 5. • N+1 failover condition occurred. • CAP card present in processor card slot 5 assumes the function of the failing CAP card.
Slots1 to 4	Off	N+1 failover operation is not engaged for this slot.
	On (green)	Indicates which CAP card failed. The N+1 CAP card is servicing the CAP card installed in this slot.

Table 1-4 describes the DS3 status LEDs for all the AP cards.

Table 1-4. DS3 Status LEDs

LED	State	Meaning
Ports 1 to 6 Sync	Off	Port is not configured or the software is not initialized.
	On (green)	Port has achieved frame synchronization.
	Flashing (green)	Port has not achieved frame synchronization. A loss of frame (LOF) or loss of signal (LOS) condition exists.
Ports 1 to 6 Maj	Off	No major alarm is detected on this port.
	On (amber)	A major alarm is detected on this port. A loss of frame (LOF), loss of signal (LOS), or alarm indication signal (AIS) condition exists.
Ports 1 to 6 Min	Off	No minor alarm is detected on this port.
	On (amber)	A minor alarm is detected on this port. A remote alarm indication (R-AIS) condition exists.
Ports 1 to 6 Test	Off	Port is operating normally.
	On (green)	Port is operating in a DS3 loopback state.

Table 1-5 describes the OC-3 status LEDs for all types of AP cards. The OC-3 status LEDs are the same for all AP cards.

Table 1-5. OC-3 Status LEDs

LED	State	Meaning
Sync (port *n*)	Off	Frame synchronization is not detected on port.
	On (green)	Frame synchronization is achieved on port.
Automatic Protection Switching (APS)	Off	APS is disabled on port.
	On (amber)	APS is enabled on port.
Test (port *n*)	Off	Port is operating in through mode.
	On (green)	Port is operating in a loopback state.
RDI (port *n*)	Off	No remote fault is detected on port.
	On (green)	Remote fault is detected on port.

Internet Forwarding Processor Card

The Internet forward processor (IFP) card provides layer 3 IP switching for the Versalar 15000. The Versalar 15000 can support three IFP cards in chassis slots 6 to 8.

Two or three IFP cards provide high-availability operation. If you have an access card in slot 1 or 2, use slot 6 for the IFP card. If you have an access card in slot 3 or 4, use slot 7 for the IFP card. Slot 8 is for redundancy; however, it can be used in normal system operation.

Note: If you do not use all the IFP slots, use the lowest numbered IFP slots first.

Figure 1-3 shows an IFP card.

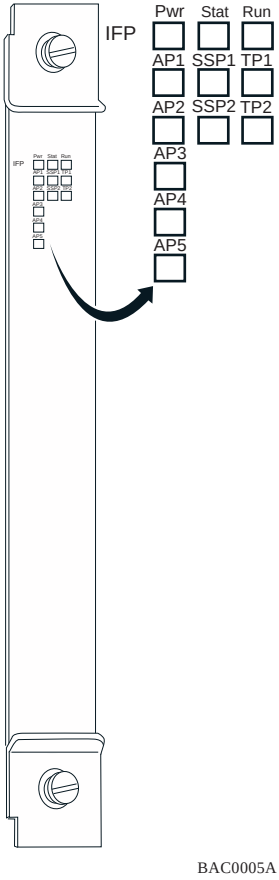


Figure 1-3. IFP Card

Table 1-6 describes the IFP card LEDs.

Table 1-6. IFP Card LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	Power is on.
Stat	Off	LED is not functioning.
	On (green)	IFP card is operating normally.
	Flashing (green)	Power-up diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the module by cycling power, issuing the **diags** command from the BCC, or installing the IFP card with the power on.
	On (amber)	Diagnostic testing failed. The IFP card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.
Run	Off	Processor code is not loaded.
	On (green)	Boot process is complete.
	Flashing (green)	Booting.
	On (amber)	Fault is detected.
AP1	Off	IFP card is not processing inbound packets for the CAP card present in processor card slot 1.
	On (green)	IFP card is processing inbound packets for the CAP card present in processor card slot 1.
AP2	Off	IFP card is not processing inbound packets for the CAP card present in processor card slot 2.
	On (green)	IFP card is processing inbound packets for the CAP card present in processor card slot 2.
AP3	Off	IFP card is not processing inbound packets for the CAP card present in processor card slot 3.
	On (green)	IFP card is processing inbound packets for the CAP card present in processor card slot 3.
AP4	Off	IFP card is not processing inbound packets for the CAP card present in processor card slot 4.
	On (green)	IFP card is processing inbound packets for the CAP card present in processor card slot 4.

(continued)

Table 1-6. IFP Card LEDs *(continued)*

LED	State	Meaning
AP5	Off	IFP card is not processing inbound packets for the CAP card present in processor card slot 5.
	On (green)	IFP card is processing inbound packets for the CAP card present in processor card slot 5.
SSP1	Off	IFP card is not processing inbound packets for the SSP card present in processor card slot 9.
	On (green)	IFP card is processing inbound packets for the SSP card present in processor card slot 9.
SSP2	Off	IFP card is not processing inbound packets for the SSP card present in processor card slot 10.
	On (green)	IFP card is processing inbound packets for the SSP card present in processor card slot 10.
TP1	Off	IFP card is not processing inbound packets for the trunk processor card present in processor card slot 11.
	On (green)	IFP card is processing inbound packets for the trunk processor card present in processor card slot 11.
TP2	Off	IFP card is not processing inbound packets for the trunk processor card present in processor card slot 12.
	On (green)	IFP card is processing inbound packets for the trunk processor card present in processor card slot 12.

System Services Processor Card

The systems services processor (SSP) card is the central processing resource on which the network layer protocols run. The SSP card is responsible for Versalar 15000 route determination, statistics, and central management. The Versalar 15000 can support two SSP cards in slots 9 and 10.

The SSP card consists of a printed circuit board with status LEDs, 1 flash memory card slot, 2 option card slots, and a modem connector (Figure 1-4).

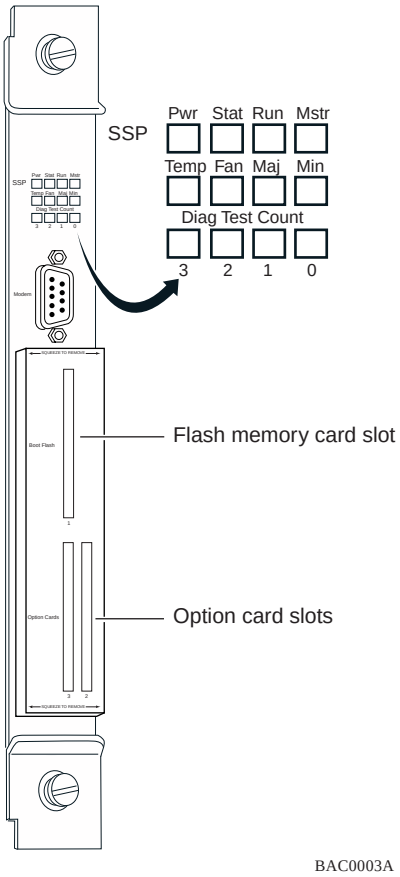


Figure 1-4. SSP Card

Table 1-7 describes the SSP card LEDs.

Table 1-7. SSP Card LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	Power is on.
Stat	Off	LED is not functioning.
	On (green)	SSP card is operating normally.
	Flashing (green)	Power-up diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the module by cycling power, issuing the **diags** command from the BCC, or installing the SSP card with the power on.
	On (amber)	Diagnostic testing failed. The SSP card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.
Run	Off	Processor code is not loaded.
	On (green)	Boot process is complete.
	Flashing (green)	Software initialization and loading are in progress.
	On (amber)	Fault is detected.
Mstr	Off	SSP card is not controlling the system resources.
	On (green)	SSP card is controlling the system resources.
Temp	Off	When the air temperature exceeds 65^{0}C, the system will shut down.
	On (green)	System temperature is normal.
	On (amber)	Air temperature exceeds 45^{0}C.
Fan	Off	Fan is operating normally.
	On (amber)	Fan is defective.
Maj	Off	No major software alarm is detected.
	On (amber)	Major fault is detected, such as a component failure or interface failure.

(continued)

Table 1-7. SSP Card LEDs *(continued)*

LED	State	Meaning
Min	Off	No minor software alarm is detected.
	On (amber)	Minor fault is detected, such as a far-end alarm or remote peer down.
Diag Test Count	Off	Nortel Networks Carrier Networking Services operating system is not executing.
	On (green)	When the Nortel Networks Carrier Networking Services operating system is executing, it uses these lights to count time.

Trunk Processor Card

The Versalar 15000 provides trunk line services for ATM and gigabit Ethernet. To accommodate trunk services, the Versalar 15000 supports up to two trunk processor cards in slots 11 and 12.

This section contains information about the following TP cards:

- ATM OC-12c/STM TP card
- Packet TP card

ATM TP Card

The ATM TP card provides an OC-3/OC12c/STM-4c optical link-level interface, constant bit rate (CBR) service, variable bit rate (VBR) service, and unspecified bit rate (UBR) service.

Figure 1-5 shows the ATM OC-12c/STM TP card.

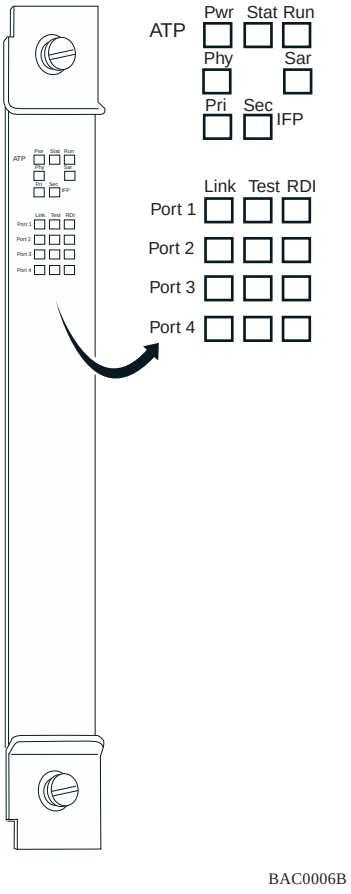


Figure 1-5. ATM TP Card

Table 1-8 describes the ATM OC-12c/STM TP card LEDs.

Table 1-8. ATM OC-12c/STM TP Card LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	Power is on.
Stat	Off	LED is not functioning.
	On (green)	TP card is operating normally.
	Flashing (green)	Power-up diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the module by cycling power, issuing the **diags** command from the BCC, or installing the TP card with the power on.
	On (amber)	Power-up diagnostic testing failed. The TP card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.
Run	Off	Processor code is not loaded.
	On (green)	Boot process is complete.
	Flashing (green)	Booting.
	On (amber)	A fault is detected. Call the Nortel Networks Technical Solutions Center.
Phy	Off	Trunk interface card is not installed.
	On (green)	Trunk interface card is present.
Sar	Off	Not loaded.
	Flashing (green)	Booting.
	On (green)	Boot is complete.
Pri IFP	Off	Primary IFP card is not in use.
	On (green)	Primary IFP card is in use.
Sec IFP	Off	Secondary IFP card is not in use.
	On (green)	Secondary IFP card is in use.
Link (port *n*)	Off	Frame synchronization is not detected on the port.
	On (green)	Frame synchronization is achieved on the port.

(continued)

Table 1-8. ATM OC-12c/STM TP Card LEDs *(continued)*

LED	State	Meaning
Test (port *n*)	Off	Port is operating in through mode.
	On (green)	Port is operating in a loopback state.
RDI (port *n*)	Off	No remote fault is detected on the port.
	On (green)	Remote fault is detected on the port.

Packet Trunk Processor Card

The Ethernet trunk service provides processing for one 1000Base gigabit Ethernet traffic stream. You can configure the packet trunk processor cards in slots 11 and 12, with gigabit Ethernet cards in corresponding slots.

Figure 1-6 shows the packet trunk processor card.

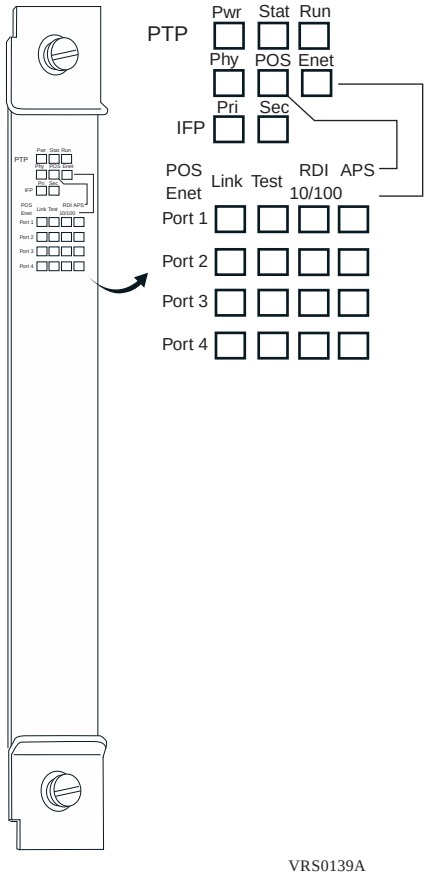


Figure 1-6. Packet Trunk Processor Card

Table 1-9 describes the Packet TP card LEDs.

Table 1-9. Packet TP Card LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	Power is on.
Stat	Off	The LED is not functioning.
	On (green)	The TP card is operating normally.
	Flashing (green)	Power-up diagnostic testing is in progress. Diagnostic testing occurs when you cold-start the module by cycling power, issuing the **diags** command from the BCC, or installing the TP card with the power on.
	On (amber)	Power-up diagnostic testing failed. The TP card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.
Run	Off	The processor code is not loaded.
	On (green)	The boot process is complete.
	Flashing (green)	The router is booting.
	On (amber)	A fault is detected. Call the Nortel Networks Technical Solutions Center.
Phy	Off	The trunk interface card is not installed.
	On (green)	The trunk interface card is present.
POS	Off	POS interface is not configured. (RFU)
	On (green)	POS interface is configured. (RFU)
Enet	Off	Enet interface is not configured.
	On (green)	Enet interface is configured.
Pri IFP	Off	The primary IFP card is not in use.
	On (green)	The primary IFP card is in use.
Sec IFP	Off	The secondary IFP card is not in use.
	On (green)	The secondary IFP card is in use.
Link (port *n*)	Off	Link is not detected on the port.
	On (green)	Link is achieved on the port.

(continued)

Table 1-9. Packet TP Card LEDs *(continued)*

LED	State	Meaning
Test (port *n*)	Off	The port is operating in normal operation mode.
	On (green)	The port is operating in a loopback mode.
RDI (POS) (port *n*)	Off	No remote fault is detected on the port. (RFU)
	On (green)	A remote fault is detected on the port. (RFU)
10/100 (Enet) (port *n*)	Off	1000 Mb (GIG) or 10 Mb interface is configured.
	On (green)	100 Mb interface is configured.
APS		Valid only when POS is configured. (RFU)

Interface Cards

The interface cards provide the link to the physical network. They receive data from the network, extract data, and forward the data to the processor cards for routing. When a processor card has data to send to a port, the interface cards accept the data and transmit it in the appropriate format.

In this guide, the term *interface card* refers to the following cards:

- Access interface cards -- T3, ARM, Quad DS3 for channelized AP, Dual OC-3 SMF and MMF for channelized AP cards, Dual OC-3 SMF and MMF for ATM access
- SSP interface cards -- SSP interface console and SSP interface Ethernet cards
- Trunk interface cards -- ATM OC-12c/STM-4c SMF and MMF, Quad OC-3 ATM trunk interface, ATM OC-3 trunk phy, and Ethernet SX and LX trunk interface cards

Access Interface Cards

The Versalar 15000 access interface cards occupy chassis slots 1 to 5 and support network interfaces for AP cards. The access interface cards are the Hex T3 (T3), ARM, Quad DS3, or Dual OC-3 interface cards, each of which is described in the sections that follow. (Note that the ARM interface card must be installed in slot 5.)

Hex T3 (T3) Interface Card

The T3 interface card provides physical line interfaces for six T3 lines. The Versalar 15000 supports four or five T3 interface cards in slots 1 to 5.

Figure 1-7 shows the T3 interface card.

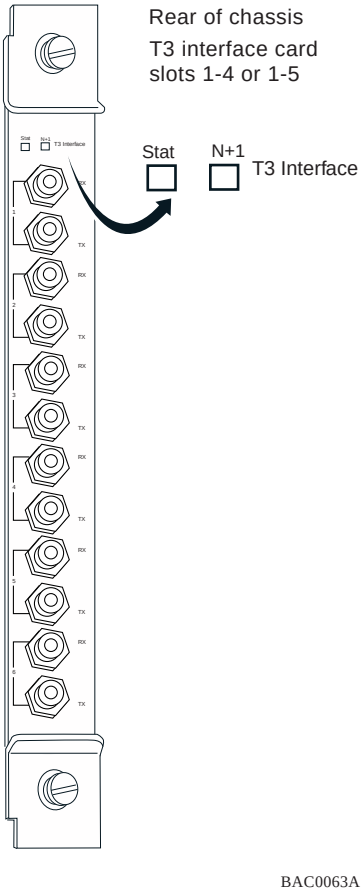


Figure 1-7. T3 Interface Card

Table 1-10 describes the T3 interface card LEDs.

Table 1-10. T3 Interface Card LEDs

LED	State	Meaning
Stat	Off	Power is off.
	On (green)	T3 card is operating normally.
	On (amber)	Diagnostic testing failed. The T3 card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.
N+1	Off	N+1 failover operation not engaged for this slot.
	On (green)	The CAP card installed in slot 5 is servicing this T3 interface card, rather than the CAP card installed in the slot corresponding to this T3 interface card.

Access Redundancy Module Interface Card

To enable N+1 redundant operation, you must install an access redundancy module (ARM) interface card in slot 5 of the chassis. The redundant AP card in slot 5 can then assume the processing duties of a failing AP card. With an ARM card installed in interface card slot 5 and a hybrid M13 and clear-channel DS3 CAP card installed in processor card slot 5, the Versalar 15000 supports failover of mixed clear-channel and channelized T3 configurations.

If a CAP card is installed in processor card slot 5, the N+1 and Slot LEDs indicate which T3 interface card is being serviced. For more information about N+1 redundancy and failover, see *Managing and Troubleshooting the Versalar Switch Router 15000*.

Figure 1-8 shows the ARM interface card.

Figure 1-8. ARM Interface Card

Table 1-11 describes the ARM interface card LEDs.

Table 1-11. ARM Interface Card LED

LED	State	Meaning
Stat	Off	Power is off.
	On (green)	ARM card is operating normally.
	On (amber)	Diagnostic testing failed. The ARM card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.

Dual OC-3 Single-Mode or Multimode Channelized Access Interface Card

The Dual OC-3 (SMF or MMF) channelized access interface card provides physical line interfaces for two channelized OC-3 lines with APS failover switching. (For information about SMF and MMF cards, refer to "Single-Mode and Multimode Interfaces" on page 1-36.) The Versalar 15000 supports four or five OC-3 interface cards in slots 1 to 5.

Figure 1-9 shows the Dual OC-3 channelized access interface card.

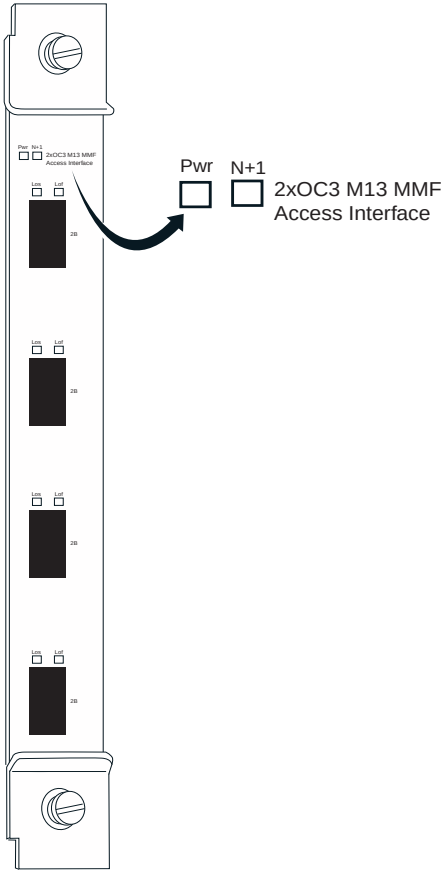


Figure 1-9. Dual OC-3 (SMF or MMF) Channelized Access Interface Card

Table 1-12 describes the Dual OC-3 (SMF or MMF) channelized access interface card LEDs.

Table 1-12. Dual OC-3 (SMF or MMF) Channelized Access Interface Card LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	OC-3 card is operating normally.
	On (amber)	Diagnostic testing failed. The OC-3 card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.
N+1	Off	N+1 failover operation is not engaged for this slot.
	On (green)	The AP card installed in slot 5 is servicing this OC-3 interface card, rather than the AP card installed in the slot corresponding to this OC-3 interface card.
LOF	Off	Loss of frame not detected.
	On (amber)	Loss of frame detected.
LOS	Off	Loss of signal not detected.
	On (amber)	Loss of signal detected.

Dual OC-3 (SMF or MMF) ATM Access Interface Card

The Dual OC-3 (SMF or MMF) ATM access interface card provides physical line interfaces for two ATM lines with APS failover switching. The Versalar 15000 supports four or five OC-3 interface cards in slots 1 to 5. (For information about SMF and MMF cards, refer to "Single-Mode and Multimode Interfaces" on page 1-36.)

Note: Refer to Figure 1-9 on page 1-29 for an illustration of a Dual OC-3 channelized access interface card that looks identical to the Dual OC-3 ATM access interface card.

Table 1-13 describes the Dual OC-3 (SMF or MMF) ATM access interface card LEDs.

Table 1-13. Dual OC-3 (SMF or MMF) ATM Access Interface Card LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (Green)	OC-3 card is operating normally.
	On (Amber)	Diagnostic testing failed. The OC-3 card is waiting for an automatic attempt to reinitiate diagnostic testing. If the Stat LED lights amber again, call the Nortel Networks Technical Solutions Center.
N+1	Off	N+1 failover operation is not engaged for this slot.
	On (Green)	The AP card installed in slot 5 is servicing this OC-3 interface card, rather than the AP card installed in the slot corresponding to this OC-3 interface card.
LOF	Off	Loss of frame not detected.
	On (Amber)	Loss of frame detected.
LOS	Off	Loss of signal not detected.
	On (Amber)	Loss of signal detected.

System Services Processor Interface Cards

The Versalar 15000 system services processor (SSP) interface cards occupy chassis slots 9 and 10. They provide dedicated interfaces for out-of-band management, as well as system-wide status. The SSP interface cards are the SSP interface console card and the SSP interface Ethernet card, each of which is described in the sections that follow.

SSP Interface Console Card

The Versalar 15000 supports one SSP interface console card in slot 10 of the chassis. The SSP interface console card consists of a bezel with status LEDs, a 9-pin D-sub console connector, an alarm terminal block, and a mute button (Figure 1-10).

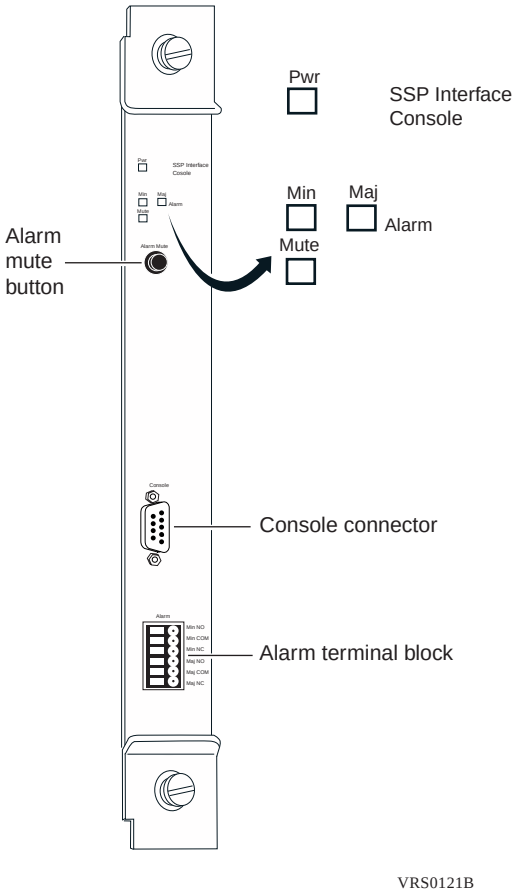


Figure 1-10. SSP-C Interface Console Card

Table 1-14 describes the SSP interface console card LEDs.

Table 1-14. SSP Interface Console Card LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	Power is on.
	On (amber)	SSP interface console card is defective. Call the Nortel Networks Technical Solutions Center.
Min Alarm	Off	No minor software alarm detected.
	On (amber)	Minor fault detected, such as a far-end alarm or remote peer down.
Maj Alarm	Off	No major software alarm detected.
	On (amber)	Major fault detected, such as a component failure or interface failure.
Mute	Off	Major and minor alarm relays are enabled.
	On (amber)	Major and minor alarm relays are disabled.

SSP Interface Ethernet Card

The Versalar 15000 supports one SSP interface Ethernet card in slot 9 of the chassis. The SSP interface Ethernet card supports the 10 Mb Ethernet interface. The SSP interface Ethernet card consists of an Ethernet 10/100 Mb connector, and an alarm terminal block and mute button (Figure 1-11).

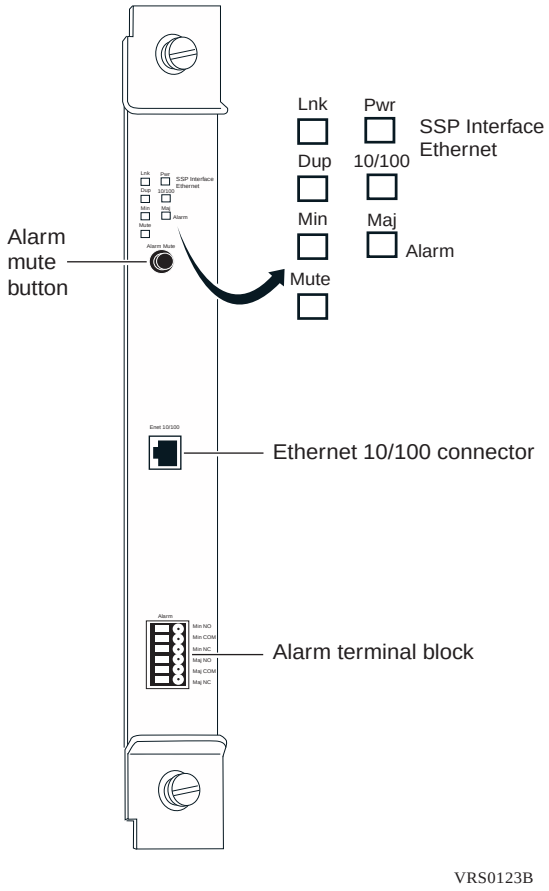


Figure 1-11. SSP-E Interface Ethernet Card

Table 1-15 describes the SSP interface Ethernet card LEDs.

Table 1-15. SSP Interface Ethernet Card LEDs

LED	State	Meaning
Lnk	Off	Ethernet link is down.
	On (green)	Link pulse received.
	Flashing (green)	Port is transmitting or receiving data.
Pwr	Off	Power is off.
	On (green)	Power is on.
	On (amber)	SSP interface Ethernet card is defective. Call the Nortel Networks Technical Solutions Center.
Dup	Off	SSP interface Ethernet card is configured for half duplex.
	On (green)	SSP interface Ethernet card is configured for full duplex.
10/100	Off	SSP interface Ethernet port is configured for 10 Mb/s.
	On (green)	Reserved for future use.
Min Alarm	Off	No minor software alarm detected.
	On (amber)	Minor fault detected, such as a far-end alarm or remote peer down.
Maj Alarm	Off	No major software alarm detected.
	On (amber)	Major fault detected, such as a component failure or interface failure.
Mute	Off	Major and minor alarm relays are enabled.
	On (amber)	Major and minor alarm relays are disabled.

Trunk ATM Interface Cards

The Versalar 15000 trunk interface cards occupy chassis slots 11 and 12 and support network interfaces for TP cards. This section contains information about the following cards:

- ATM OC-12c/STM-4c single-mode and multimode trunk interface cards
- Quad OC-3 ATM trunk interface card

Single-Mode and Multimode Interfaces

The single-mode fiber (SMF) and multimode fiber (MMF) interfaces operate with a wide variety of ATM switches and are compliant with Bellcore standards. You can view modes as bundles of light entering the fiber at a particular angle. Single-mode fiber allows only one mode of light to propagate through the fiber; multimode fiber allows multiple modes of light to propagate.

Depending on the entry angles, multiple modes of light propagating through the fiber travel different distances, thus causing them to arrive at their destination at different times. This phenomenon is called *modal dispersion*, and it results in single-mode fiber being capable of higher bandwidth and greater cable run distances than multimode fiber. For more information about transmission distances for single-mode and multimode fiber, see “OC-12c/STM-4c ATM Interface Card Specifications” on page A-6.

OC-12c/STM-4c ATM Interface Cards

The ATM OC-12c/STM-4c single-mode and multimode trunk interface cards provide an ATM OC-12c/STM-4c link-level interface. The Versalar 15000 supports one or two OC-12c/STM-4c single-mode cards, one or two OC-12c/STM-4c multimode cards, or one single-mode and one multimode card. You can differentiate multimode cards from single-mode cards by their labels, as shown in Figure 1-12, which shows a multimode card.

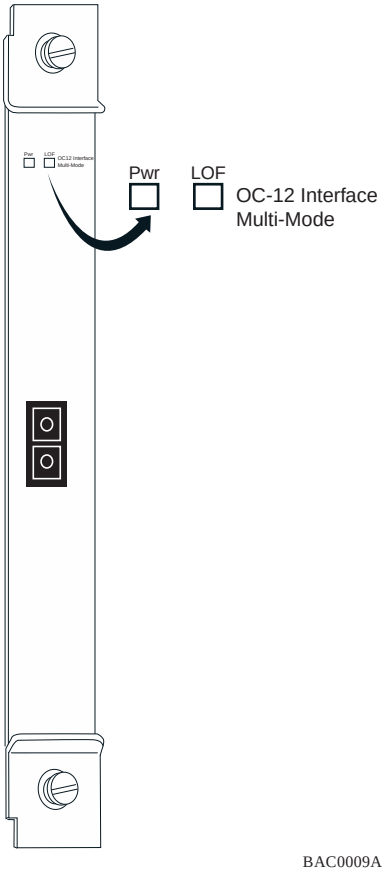


Figure 1-12. OC-12c/STM-4c ATM Interface Card

Table 1-16 describes the OC-12c/STM-4c interface card LEDs.

Table 1-16. OC-12c/STM-4c ATM Interface Card LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	Power is on and operating normally.
LOF	Off	Loss of frame not detected.
	On (amber)	Loss of frame detected.

Quad OC-3 ATM Trunk Interface Card

Figure 1-13 shows the Quad OC-3 ATM trunk interface card. The card consists of a printed circuit board, an EMI card shield, a bezel with status LEDs, and 2 captive screws to secure the card in place. You can differentiate multimode cards from single-mode cards by their labels, as shown in Figure 1-13, which shows a multimode card.

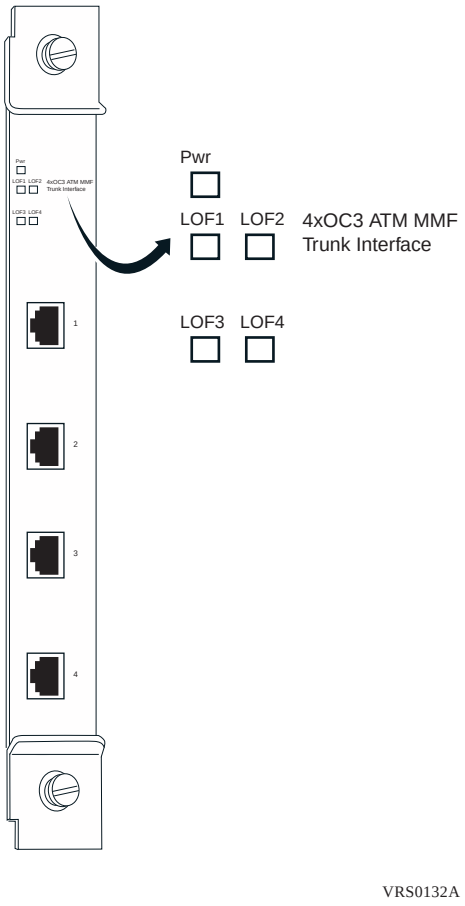


Figure 1-13. Quad OC-3 ATM Trunk Interface Card

Table 1-17 describes the Quad OC-3 ATM trunk interface LEDs.

Table 1-17. Quad OC-3 ATM Trunk Interface LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	Power is on and operating normally.
LOF (port 1-4)	Off	Loss of frame not detected.
	On (amber)	Loss of frame detected.

Trunk Ethernet Interface Cards

The Versalar 15000 trunk Ethernet interface cards occupy chassis slots 11 and 12 and support network interfaces for TP cards. This section contains information about the following cards:

- 1000M-LX Ethernet trunk interface card
- 1000M-SX Ethernet trunk interface card

1000M-LX Ethernet Trunk Interface Card

The LX Ethernet trunk interface card is a single-port 1000-base LX Ethernet module. The Versalar 15000 supports one or two LX Ethernet trunk interface cards.

Figure 1-14 shows the 1000M-LX Ethernet trunk interface card.

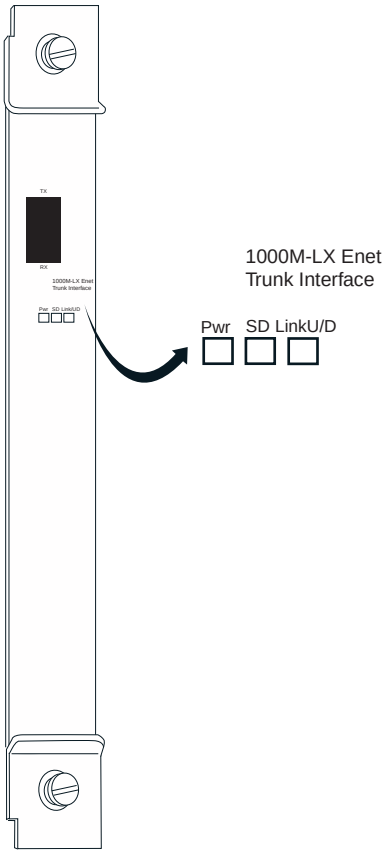


Figure 1-14. 1000M-LX Ethernet Trunk Interface Card

Table 1-18 shows the 1000M-LX Ethernet trunk interface card LEDs.

Table 1-18. 1000M-LX Ethernet Trunk Interface LEDs

LED	State	Meaning
Pwr	Off	Power is off.
	On (green)	Power is on.
SD	Off	No signal detected.
	On (green)	Optical signal detected.
Link U/D	Off	Link is down.
	On (green)	Link is up.

1000M-SX Ethernet Trunk Interface Card

The SX Ethernet trunk interface card is a single-port 1000-base SX Ethernet module. The Versalar 15000 supports one or two SX Ethernet trunk interface cards.

The 1000M-SX Ethernet trunk interface card looks exactly the same as the 1000M-LX Ethernet trunk interface card. The LEDs are also the same. Refer to Figure 1-14 and Table 1-18 for more information about the card and the LEDs.

Chapter 2
Installing the Versalar 15000

This chapter describes how to install the Versalar 15000 chassis. It includes the following topics:

Topic	Page
Preparing to Install the Versalar 15000	2-2
Installing the Versalar 15000	2-10

Preparing to Install the Versalar 15000

Before beginning the installation, verify that:

- Your shipment is complete and undamaged.
- You have the cables, tools, and other equipment that you need.
- Your installation site meets the physical, electrical, and environmental requirements.

The sections that follow provide information to help you prepare for installation.

Caution: The Versalar 15000 is intended for use in a restricted access location.

Verifying Shipment Contents

Inspect all items for shipping damage. If you detect any damage, do not install the Versalar 15000. Call the Nortel Networks Technical Solutions Center in your area (see “How to Get Help” on page xx).

In addition to the Versalar 15000 and this guide, your shipping container contains several hardware accessories. Verify that the items in the shipping container match those on the shipment packing list.

Use Table 2-1 as a checklist when verifying the contents of the shipping container.

Table 2-1. Versalar 15000 Shipping Accessories

Check	Accessory	Use To
	• One 15-foot AT standard molded serial cable • One null modem crossover adapter • One 10-foot console serial cable	Connect an optional management console.
	Bracket kit containing: • Two angle brackets • Ten cagenut screws with washers • Ten cagenuts	Mount the Versalar 15000 in an equipment rack. (Use the cagenuts only if the equipment rack does not have threaded rail holes.)
	ESD wrist strap	Direct the discharge of static electricity from your body to the chassis.

Figure 2-1 illustrates the accessories in the Versalar 15000 shipping container.

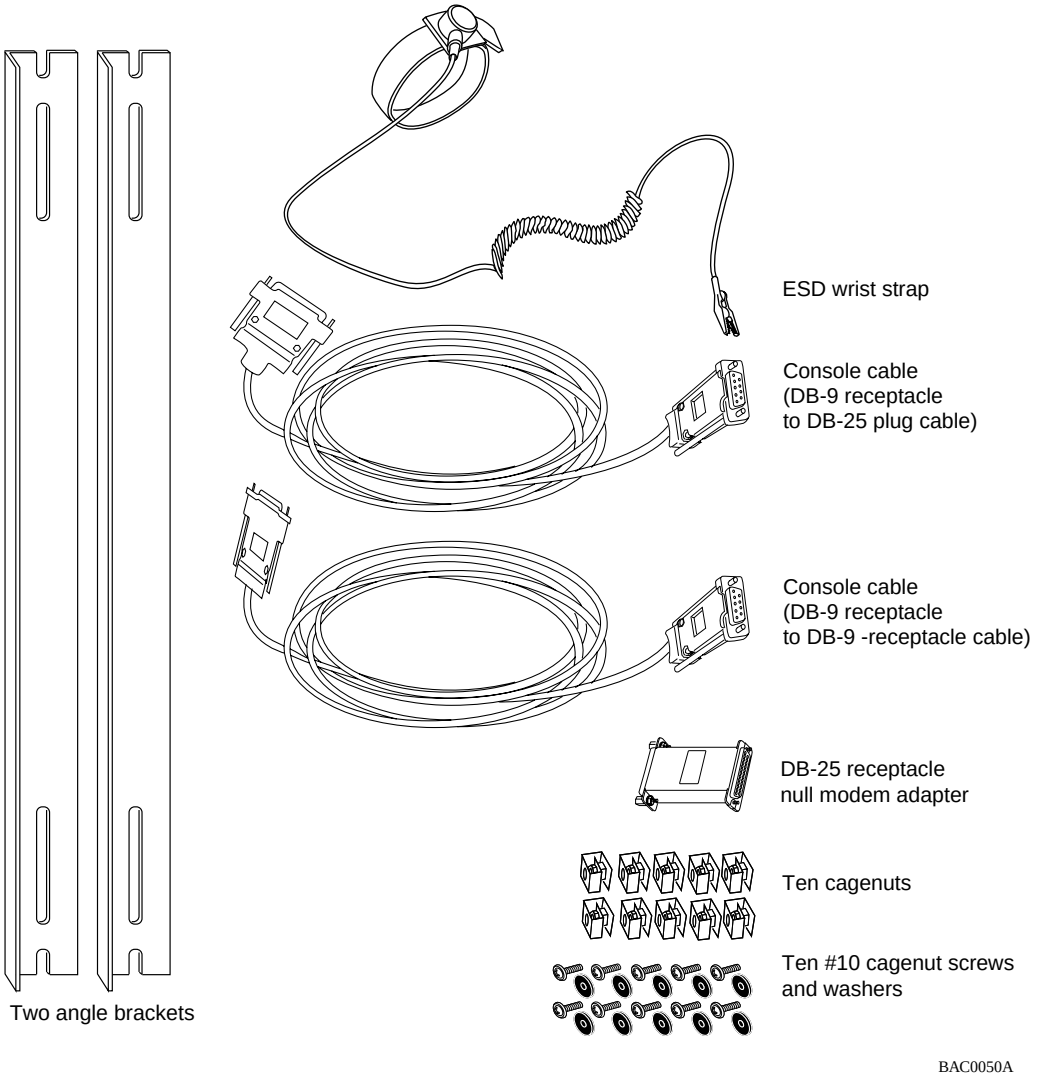


Figure 2-1. Accessories in the Versalar 15000 Shipping Container

Supplying Equipment

You might need items that are not included in the Versalar 15000 accessory package. Before installing the Versalar 15000 hardware, ensure that you have all the cables, tools, and other equipment that you need.

Management Console

To configure startup options and to monitor the results of startup diagnostics, you can attach an optional VT-100 console or equivalent, such as a PC terminal emulator. Or, you can attach an AT-compatible modem to allow dial-in access to startup configuration and diagnostics.

Cables

Unless you specifically ordered them, the cables required for your network configuration are not included in the Versalar 15000 accessory package. If you do not have the proper cables, contact your network administrator.

Table 2-2 lists the network cables that are required:

Table 2-2. Network Cables

Order No.	Length	Physical Cable Description	Connection
7163	9 ft (2.7 m)	SC duplex to SC duplex connectors; multimode fiber cable	Nortel Networks PHY A or PHY B interface to a type SC network connection
7165	9 ft (2.7 m)	SC duplex to SC duplex connectors; single-mode fiber cable	Nortel Networks PHY A or PHY B interface to a type SC network connection

Figure 2-2 shows both the multimode (order no. 7163) and the single-mode (order no. 7165) SC duplex cables.

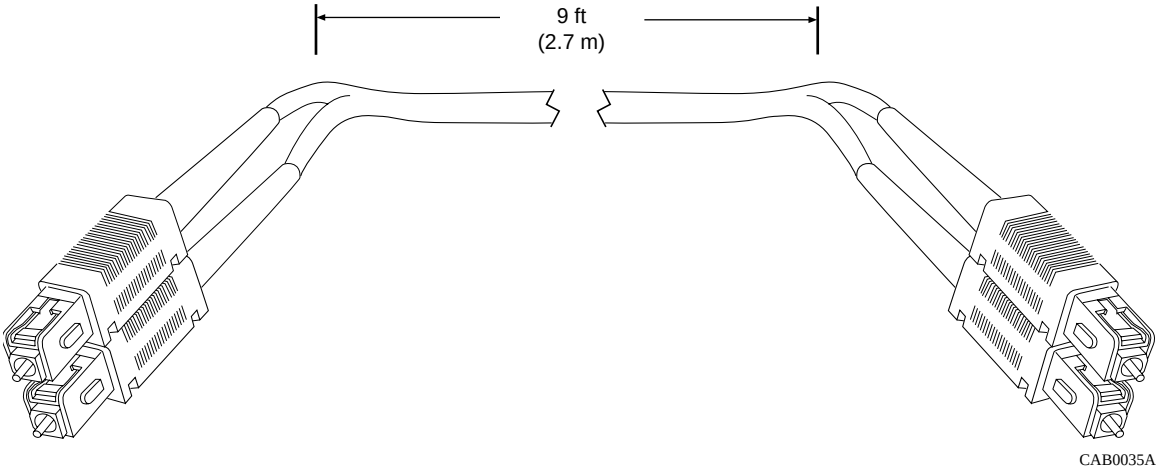


Figure 2-2. SC Duplex to SC Duplex Cable

Hardware for Mounting the Versalar 15000 in an Equipment Rack

To install the Versalar 15000 in an equipment rack, you need a Phillips screwdriver and a rack that meets the following specifications:

- Heavy-duty steel construction
- Electronic Industries Association (EIA) standard hole-spacing
- Four-post rack with width of 19 in. (48.26 cm) and depth of 24 in. (60.96 cm)
- Four-post rack with width of 23 in. (58.42 cm) and depth of 24 in. (60.96 cm)
- Two-post rack with width of 19 in. (48.26 cm)

If the rack does not have threaded rail holes, you must use the supplied cagenuts (see Figure 2-1) with the cagenut screws.

Verifying Site Requirements

Ensure that the installation site meets the space, electrical, and environmental requirements listed in this section. See Appendix A, “Technical Specifications,” for more information.

Space Requirements

The installation site must provide sufficient free space around the Versalar 15000 to ensure proper ventilation and access for servicing (Table 2-3).

Table 2-3. Space Requirements

Width	Minimum Depth	Depth for Servicing
19 in. (48.2 cm)	22 in. (55.8 cm)	46.2 in. (1 m 17.5 cm)

AC Input Electrical Requirements

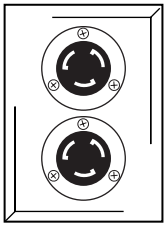
If you have purchased the AC power option, the installation site must meet the following electrical requirements for AC power (Table 2-4).

Table 2-4. Electrical Requirements for AC Model (23-inch chassis)

Input Voltage	Maximum Input Current	Maximum System Power
180-264 volts (V) 50-60 hertz (Hz), +/-3%	14 amperes (A) maximum at 180 VAC for *each* input (2 inputs per power unit)	2000 watts (w)

Table 2-5 lists the wall receptacle requirements for AC power.

Table 2-5. Wall Receptacle Requirements for AC Power

Country	Receptacle	Voltage
United States and Canada	National Electrical Manufacturers Association (NEMA) L6-20R locking receptacle  VRS0120A	180-264 V
Any other country	Your Versalar distributor attaches the necessary plug to the power cable and tells you which receptacle you need.	200-240 V

DC Input Electrical Requirements

The installation site must meet the following electrical requirements for DC power (Table 2-6):

Table 2-6. Electrical Requirements for DC Model

Nominal Output Voltage	Maximum Output Current	Physical
-48/-60 volts direct current (VDC) nominal	40 A	Reinforced insulation from the main DC power

Environmental Requirements

The installation site must meet the following environmental requirements (Table 2-7).

Table 2-7. Environmental Requirements

Altitude	Humidity	Temperature
0-10,000 ft (0-3048 m)	5%-85%, noncondensing	41°-104°F (5°-40°C), stable

Installing the Versalar 15000

When you are ready to install the Versalar 15000, you can do one of the following:

- Position the Versalar 15000 on a flat, sturdy, horizontal surface.
- Mount the Versalar 15000 in a standard four-post equipment rack.
- Mount the Versalar 15000 in a two-post equipment rack.

Note: Remove the air flow modules to make the chassis lighter during the installation (see Chapter 4, “Installing Processor and Interface Cards and Connecting Equipment”).

Positioning the Versalar 15000 on a Flat Surface

When positioning the Versalar 15000 on a flat surface, make sure that the surface is large enough for the Versalar 15000 to operate properly and sturdy enough to support the combined weight of the Versalar 15000 and any cables that you attach to it.

Mounting the Versalar 15000 in a Four-Post Rack

To mount the Versalar 15000 in a four-post rack, you need the following equipment:

- Two angle brackets (shipped with the Versalar 15000).
- A standard 19-inch or 23-inch equipment rack (requires a 23-inch optional rack mount kit). If the rack does not have threaded rail holes, you must attach the cagenuts shipped with the Versalar 15000.
- Eight cagenut screws and washers (extra screws are shipped with the Versalar 15000).
- A Phillips screwdriver.

In a 7-foot four-post rack, you can install:

- Three Versalar 15000 platforms with DC power
- Two Versalar 15000 platforms with optional AC power units installed

To ensure proper ventilation, make sure that there is at least 4 in. (10.16 cm) of space between the platforms. Figure 2-3 shows three DC power-based platforms as well as two AC power-based platforms installed in four-post racks.

Figure 2-3. Three Versalar 15000 DC Platforms and Two AC Platforms in a Four-Post Rack

Mounting the Versalar 15000 in a 19-Inch Rack

To install the Versalar 15000 in a 19-inch four-post rack:

1. **Measure at least 27 in. (68.6 cm) of free vertical space inside the rack and mark the spot.**
2. **Mount the angle brackets in the area indicated in Figure 2-4.**
3. **If the holes in the rack's vertical supports are not threaded for cagenut screws, insert a cagenut in five locations (Figure 2-4).**
4. **Holding the Versalar 15000 in position, align the flanged end of each bracket with two holes on each side of the vertical rack support.**

   It is easiest to complete this step with two people. Make sure that the hole pairs on either side of the vertical support match horizontally.
5. **Insert a cagenut screw through each flange hole and into the corresponding hole in the rack (Figure 2-5).**
6. **Tighten each cagenut screw with a Phillips screwdriver.**

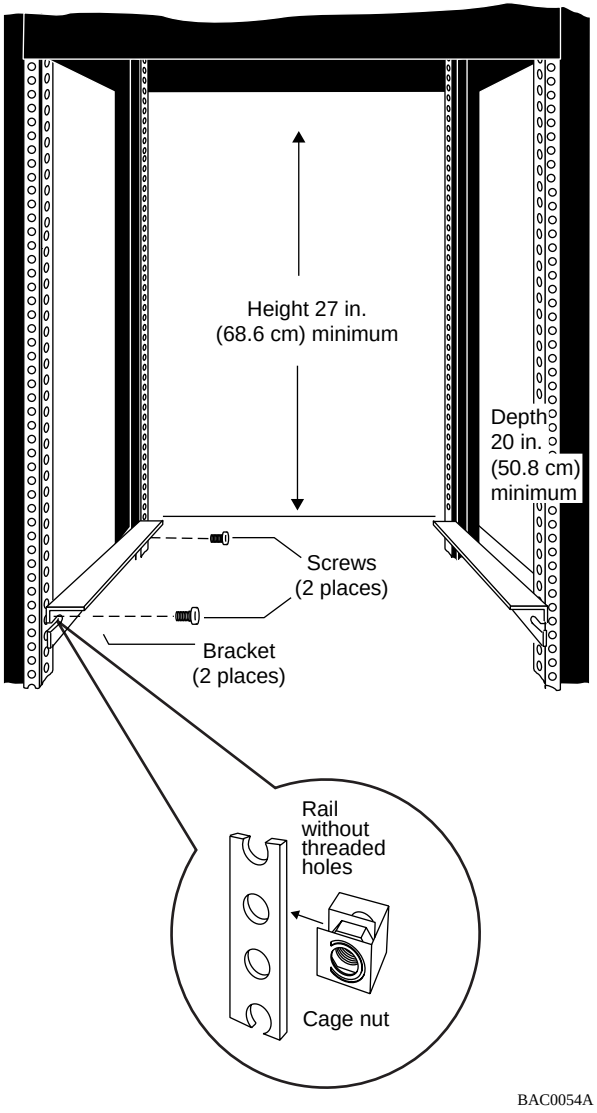


Figure 2-4. Attaching Angle Brackets in a 19-Inch Rack

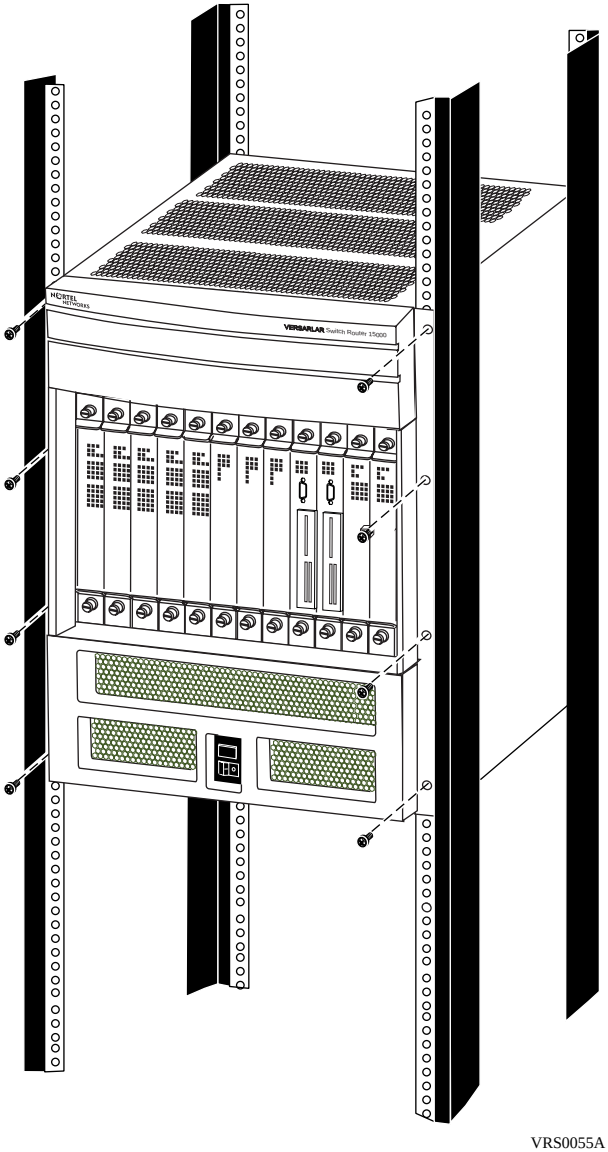


Figure 2-5. Installing the Versalar 15000 in a 19-Inch Four-Post Rack

Mounting the Versalar 15000 in an Optional 23-Inch Rack

To install the Versalar 15000 in a 23-inch four-post rack:

1. **Measure at least 27 in. (68.6 cm) of free vertical space inside the rack and mark the spot.**
2. **Mount the angle brackets supplied with the 23-inch rack mount kit horizontally in the area indicated in Figure 2-6.**

Note: The angle brackets supplied with the 23-inch rack mount kit are wider than the angle brackets supplied with the chassis.

---

3. **Using a Phillips screwdriver, remove the 5 screws securing each of the two vertical flanges to the Versalar 15000 (Figure 2-7). Discard the flanges.**
4. **Using the 8 screws that you removed from the vertical flanges, install the flanges supplied with the 23-inch rack mount kit as shown in Figure 2-7.**
5. **If the holes in the rack's vertical supports are not threaded for cagenut screws, insert a cagenut in five locations.**
6. **Holding the Versalar 15000 in position, align the flanges with two holes on each side of the vertical rack support (Figure 2-8).**

   It is easiest to complete this step with two people. Make sure that the hole pairs on either side of the vertical support match horizontally.
7. **Insert a cagenut screw through each flange hole and into the corresponding hole in the rack.**
8. **Tighten each cagenut screw with a Phillips screwdriver.**

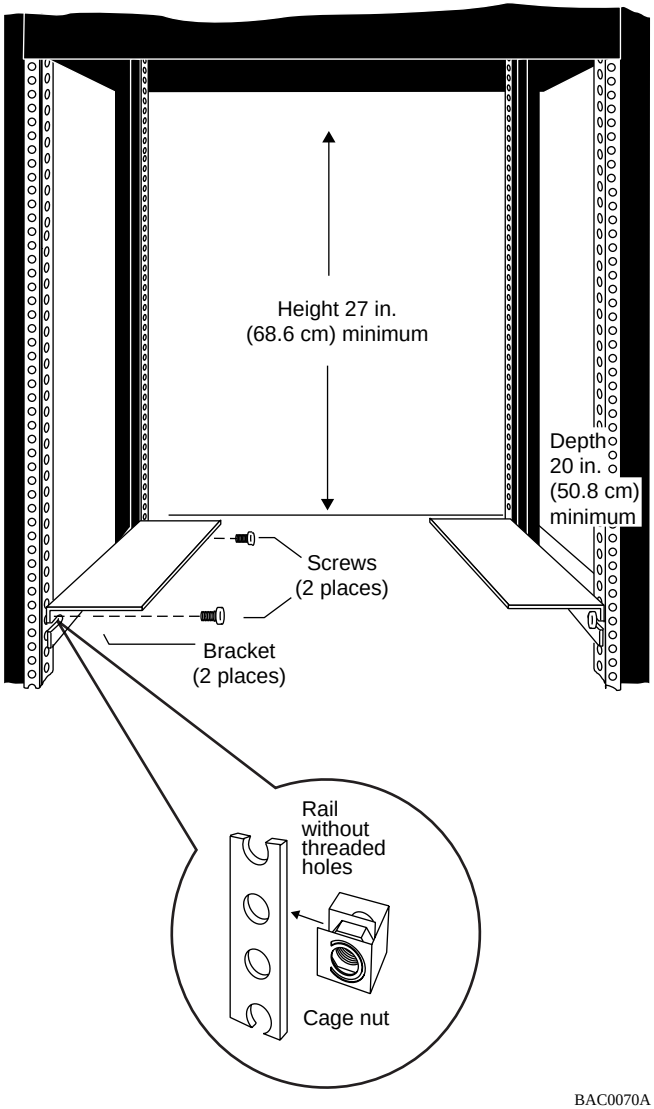


Figure 2-6. Attaching Angle Brackets in a 23-Inch Rack

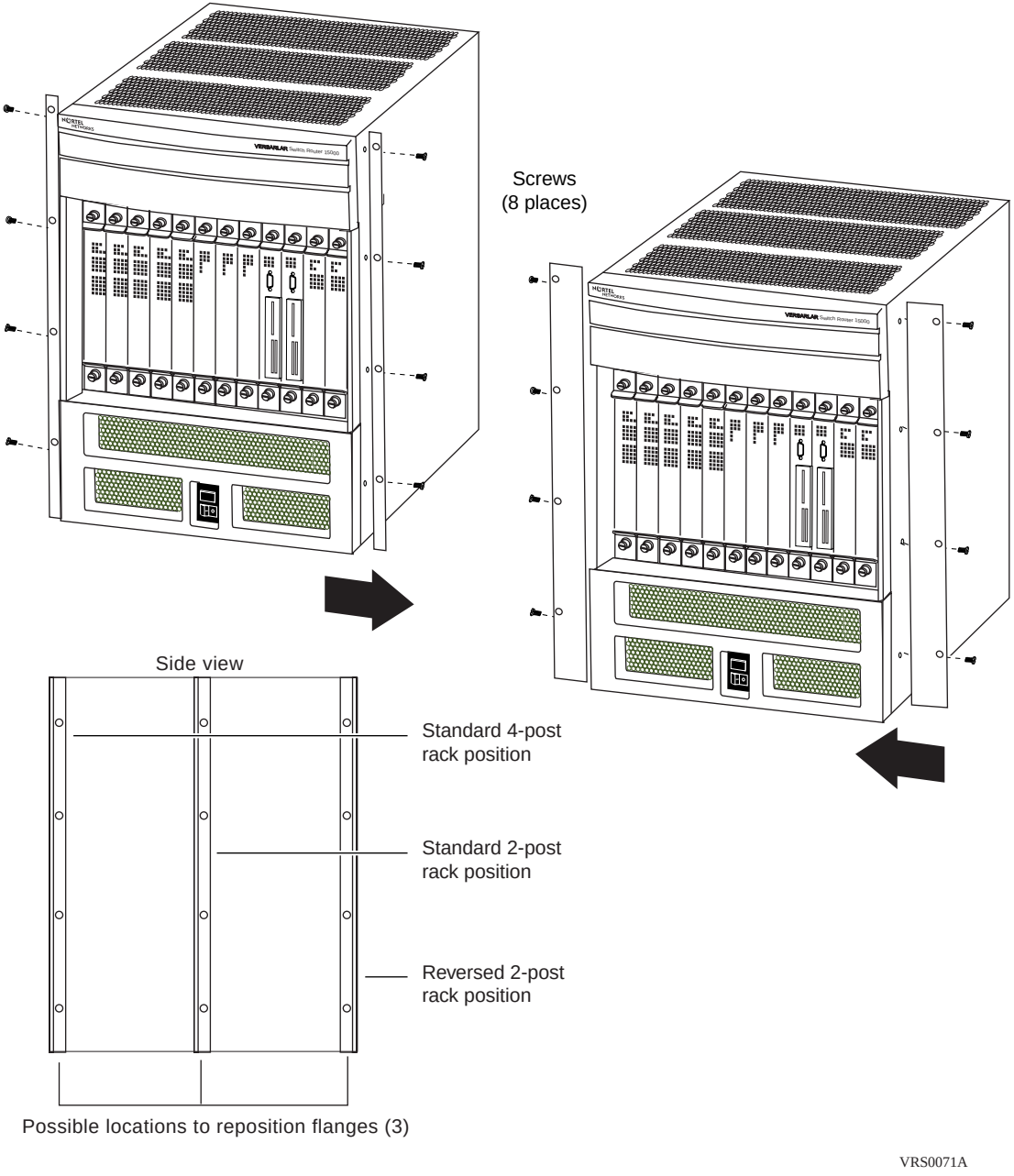


Figure 2-7. Repositioning the Vertical Flanges for Either a Two- or Four-Post Rack

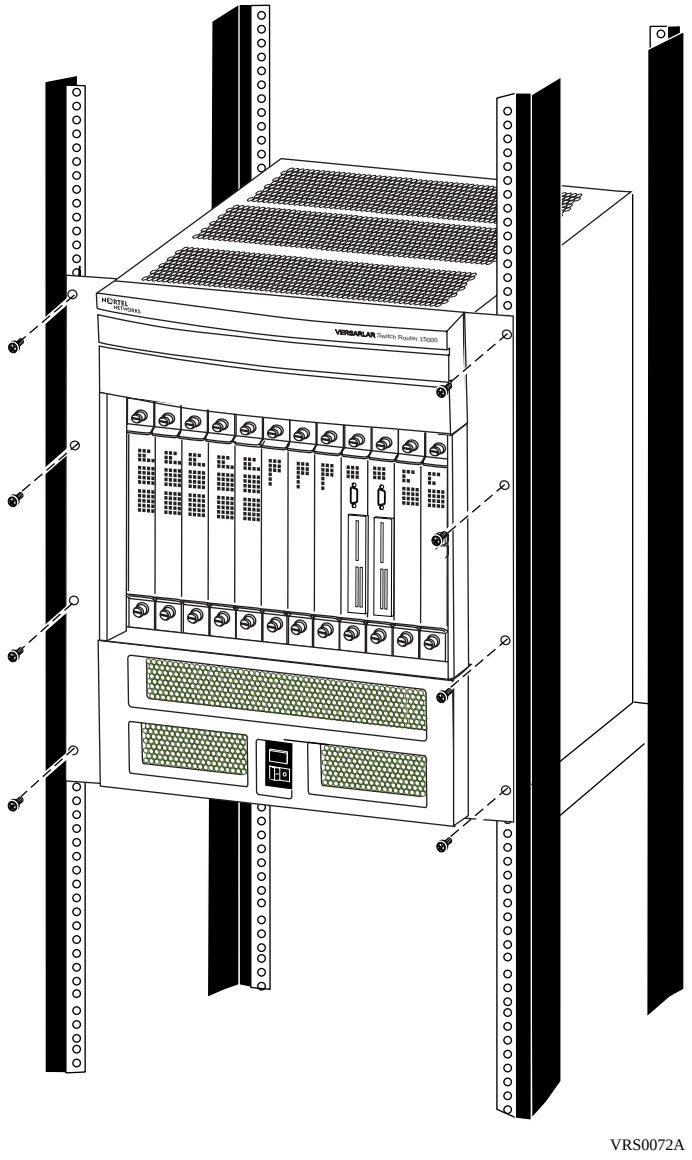


Figure 2-8. Installing the Versalar 15000 in a 23-Inch Four-Post Rack

Mounting the Versalar 15000 in a Two-Post Rack

To mount the Versalar 15000 in a two-post rack, you need the following equipment:

- A standard 19-inch equipment rack. If the rack does not have threaded rail holes, you must attach the 8 cagenuts shipped with the Versalar 15000.
- Eight cagenut screws and washers (extra screws are shipped with the Versalar 15000).
- A Phillips screwdriver.

Note: You can install three Versalar 15000 platforms in a two-post rack. To ensure proper ventilation, make sure that there is at least 4 in. (10.1 cm) of space between them.

To install the Versalar 15000 in a two-post rack:

1. **Measure at least 27 in. (68.6 cm) of free vertical space inside the rack and mark the spot.**
2. **Using a Phillips screwdriver, remove the 4 screws securing each of the two vertical flanges to the Versalar 15000 (Figure 2-9).**

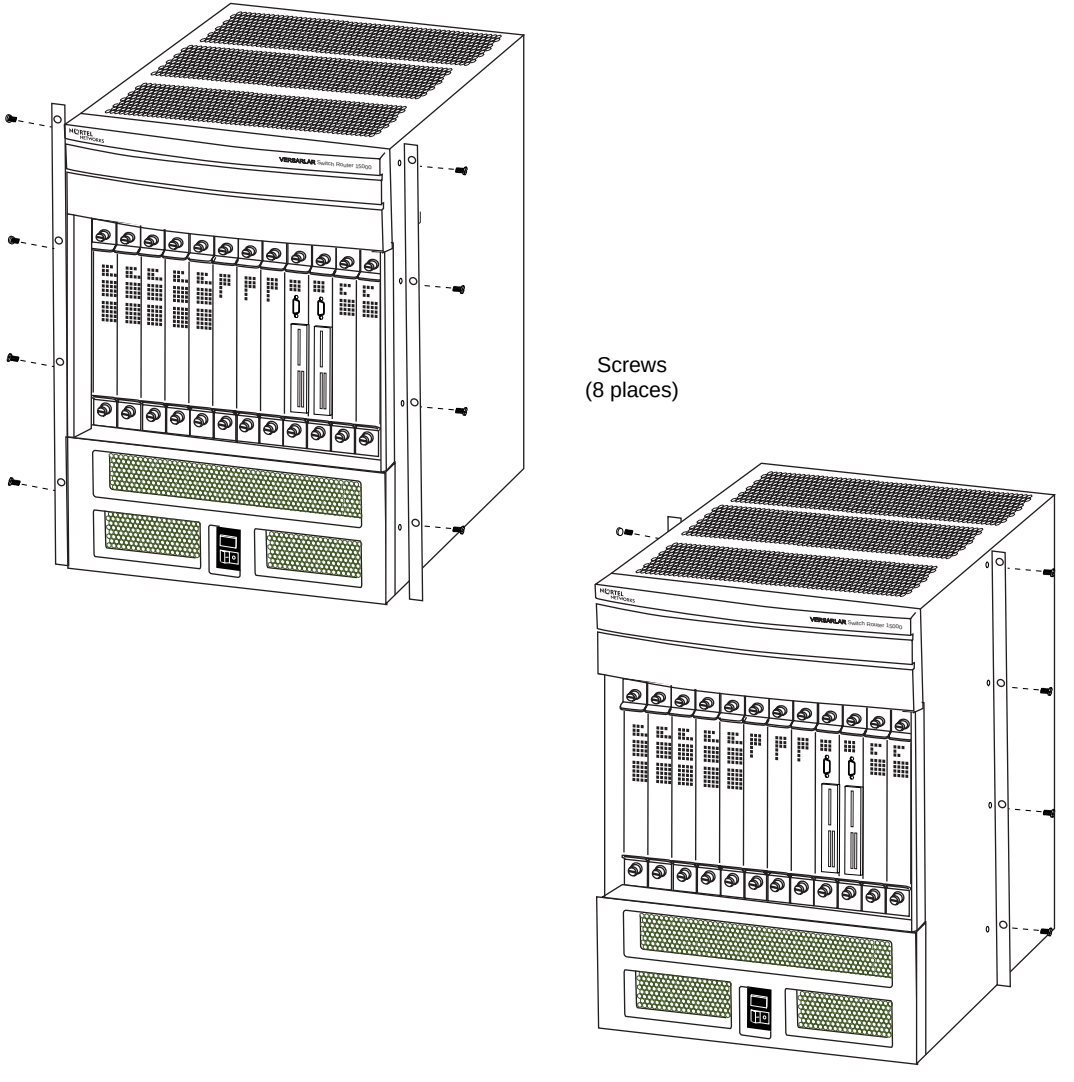


Figure 2-9. Repositioning the Vertical Flanges in a Two-Post Rack

3. **Ensure that the slots in the Versalar 15000 flanges align with the holes in the rack.**

   If the holes in the rack's vertical supports are not threaded for cagenut screws, insert a cagenut in 8 locations. (See Figure 2-9.)

4. **Mount the vertical flanges on the Versalar 15000 as shown in Figure 2-9.**

5. **Holding the Versalar 15000 in position, align the flanges with two holes on each side of the vertical rack support (Figure 2-10).**

   It is easiest to complete this step with two people. Make sure that the hole pairs on either side of the vertical support match horizontally.

6. **Insert a cagenut screw through each flange hole and into the corresponding hole in the rack.**

7. **Tighten each cagenut screw with a Phillips screwdriver.**

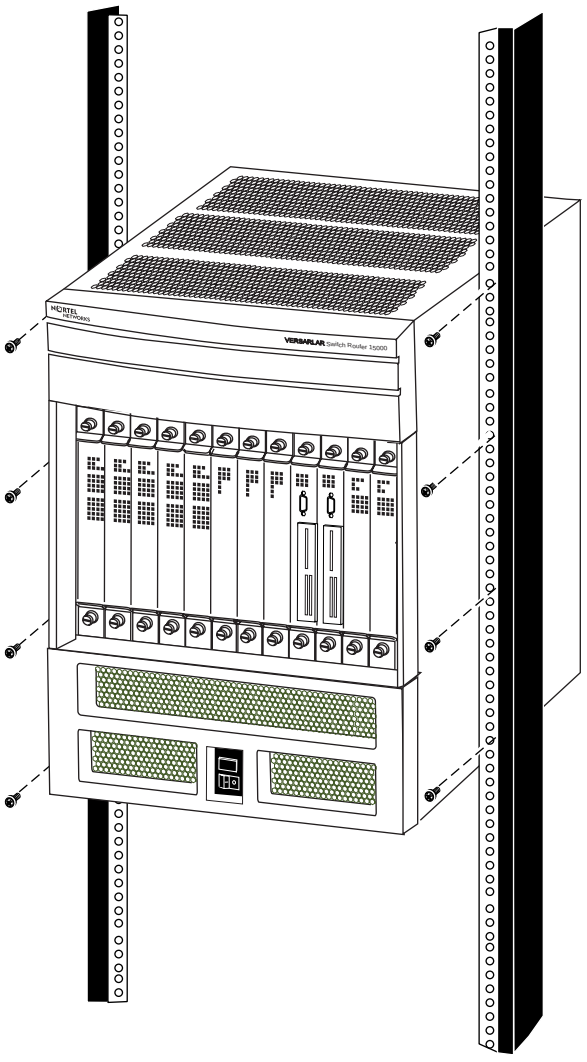


Figure 2-10. Installing the Versalar 15000 in a Two-Post Rack

Chapter 3
Installing Power Supplies

This chapter contains information about installing power supplies. It is useful only for users who need information about:

- DC redundancy
- AC support

This chapter includes the following topics:

Topic	Page
Power Modules	3-1
Installing a Redundant DC Power Module	3-4
Connecting to the DC Power Source	3-12
Installing Optional AC Power Module(s)	3-19
Connecting to the Optional AC Power Module(s)	3-23

Power Modules

The Versalar 15000 operates from DC source power or with a separate optional AC power unit. The Versalar 15000 contains one or two DC-input power modules (see Figure 3-1 on page 3-2).

The Versalar 15000 ships with a single DC power module installed in the right power module slot. You can install a second power module for redundancy and high-availability operation.

Figure 3-1 shows a DC input power module.

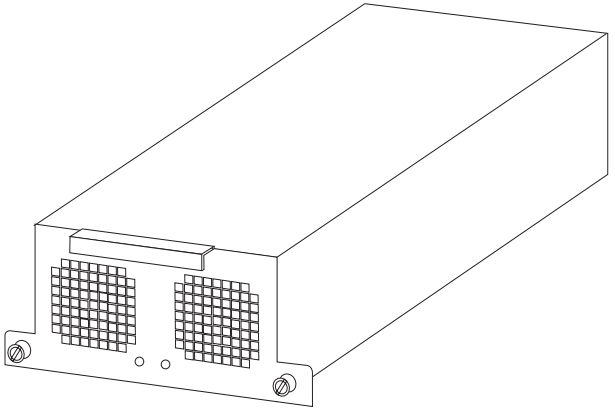


Figure 3-1. Versalar 15000 DC Power Module

Table 3-1 describes the DC power module LEDs.

Table 3-1. DC Power Module LEDs

LED	State	Meaning
DC Output OK	Off	No output is present.
	On (green)	Power supply output is normal.
DC Input OK	Off	No input is present.
	On (green)	DC input is OK.

The separate optional AC power unit ships with one AC power supply module. The AC power unit can include a second AC power supply for redundancy, as shown in Figure 3-2.

Note: Regardless of whether your power is AC or DC, you must use at least one DC power module. Two of each DC and AC is recommended for redundancy. However, if necessary, you can use two AC units with one DC unit.

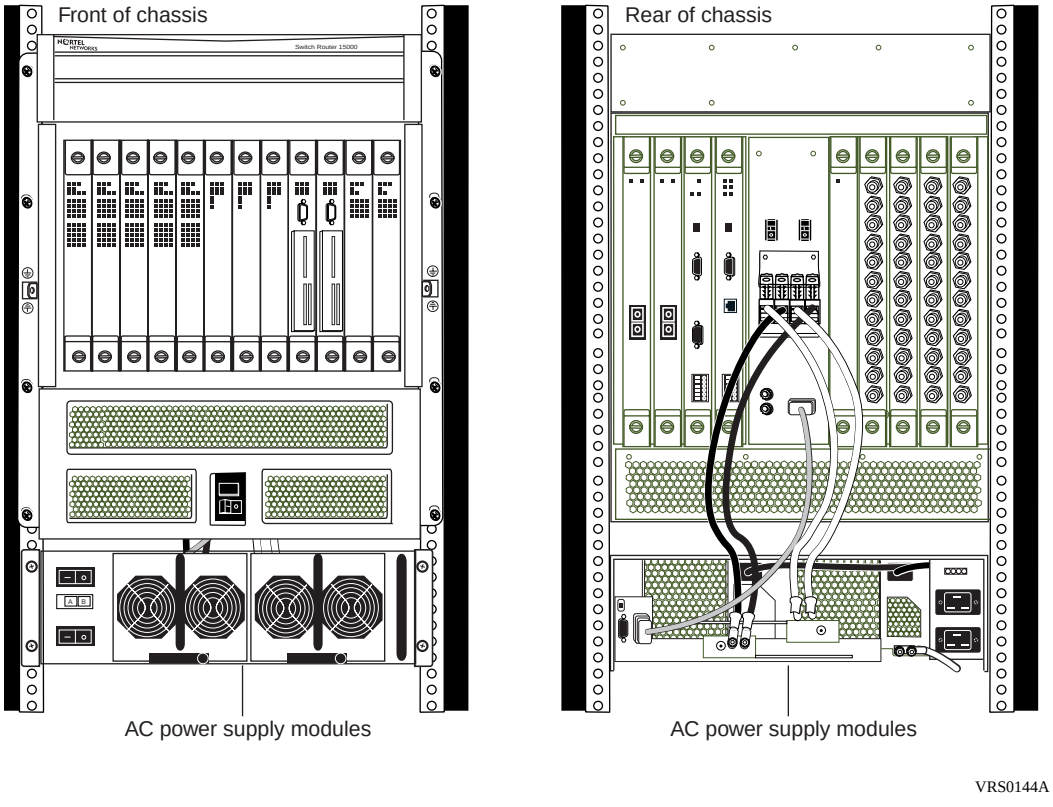


Figure 3-2. Front and Rear Views of the Versalar 15000 with Two Optional AC Power Modules

Table 3-2 describes the AC power unit LEDs.

Table 3-2. AC Power Module LEDs

LED	State	Meaning
AC Good	Off	No input is present.
	On (green)	AC input is present.
Fail	Off	No problems.
	On (Red)	DC output has failed.
Pwr Good	Off	No output is present.
	On (green)	DC output is normal.

Installing a Redundant DC Power Module

The Versalar 15000 ships with a single DC power module installed in the right power module slot. You can install a second power module for DC redundancy and to provide support for AC redundancy.

You can install a second power module with the power on or off. If two power modules are installed, you can remove one power module without affecting the operation of the hardware platform. You should replace the failed power module as soon as possible to restore high-availability operation.

The operating system generates an event message in response to any change in the status of a power module. These messages identify the power module by its slot. From the front of the Versalar 15000, power module slot 1 is on the left, and power module slot 2 is on the right.

Removing and Replacing the Front Bezels

To access the DC power supplies, you must remove the bottom front bezel.

To remove the top or bottom front bezel:

1. **Using both hands, pull the bottom of the bezel forward (Figure 3-3).**
2. **Remove the bezel from the chassis.**

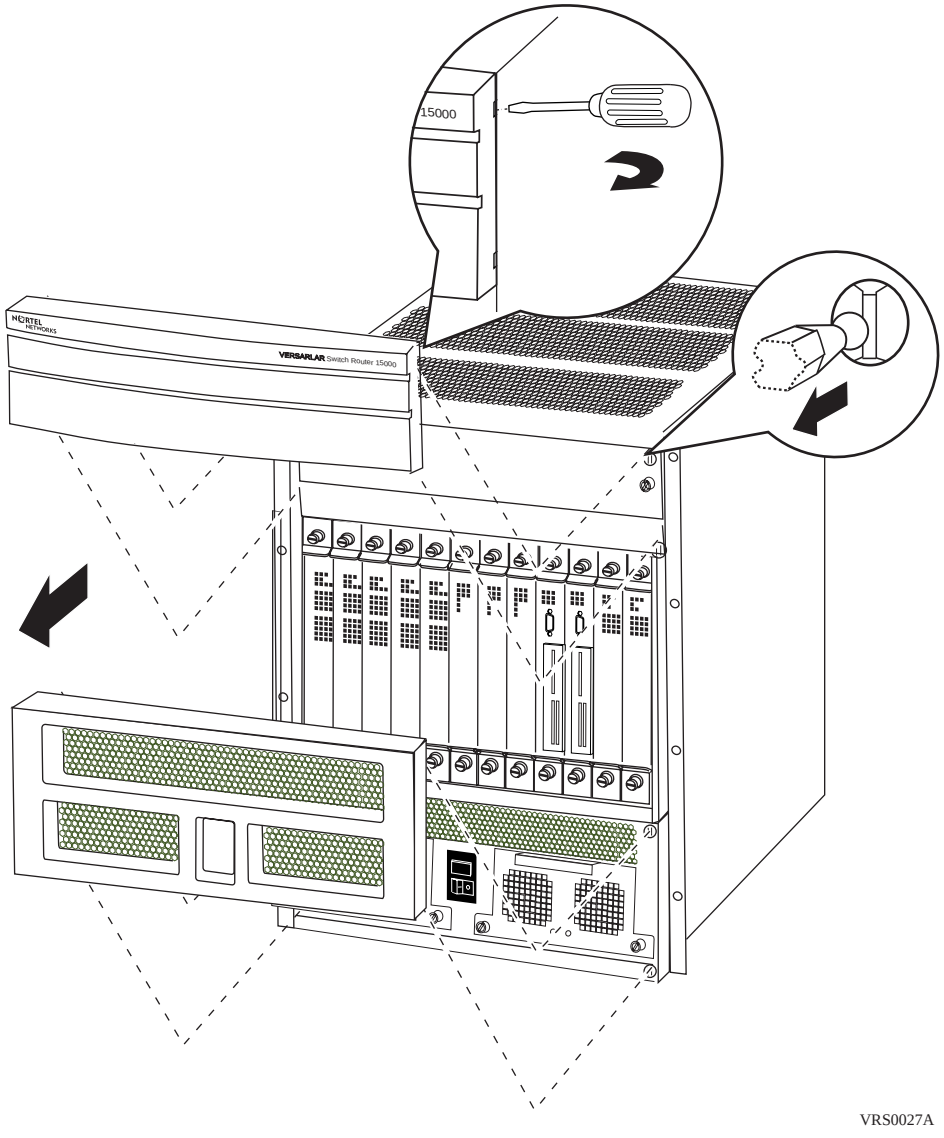


Figure 3-3. Removing the Versalar 15000 Front Bezels

To replace the top or bottom front bezel:

1. **Align the mounting retainers on the inside of the bezel with the holes on the front of the chassis (Figure 3-4).**
2. **Push the sides of the bezel into place.**

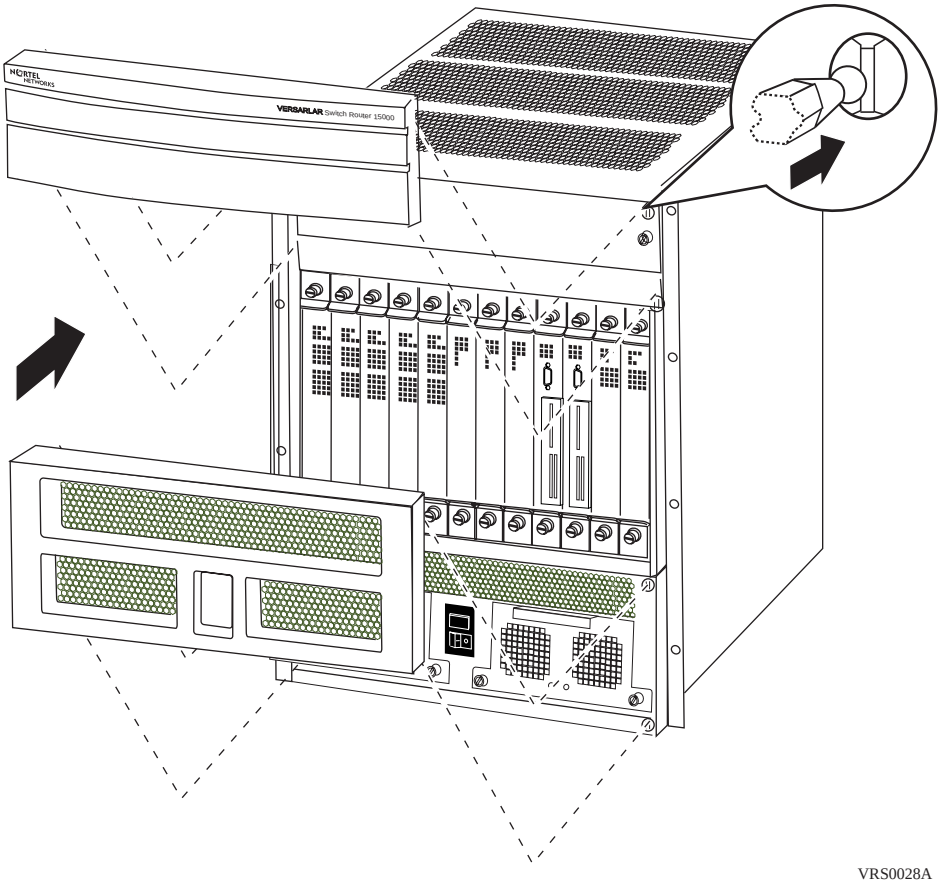


Figure 3-4. Replacing the Versalar 15000 Front Bezels

Removing and Installing a Power Filler Plate

The purpose of the power filler plate is to maintain the proper cooling airflow in the Versalar 15000. If you remove a power module from the Versalar 15000 without replacing it, you must install a power filler plate. When you add a second power module, you must first remove the installed power filler plate from the redundant power slot.

To remove a power filler plate:

1. **Remove the bottom front bezel.**

   For instructions, see "Removing and Replacing the Front Bezels" on page 3-4.

2. **Using a flat-tip screwdriver, loosen the 2 captive screws that fasten the power filler plate to the chassis until the power filler plate disengages (Figure 3-5).**

3. **Pull the power filler plate away from the Versalar 15000.**

Caution: To maintain proper cooling, never operate the Versalar 15000 with an empty power module slot. Save the filler plate for possible use in later changes to hardware configuration.

To install a power filler plate:

1. **Remove the bottom front bezel.**

   For instructions, see "Removing and Replacing the Front Bezels" on page 3-4.

2. **Place the power filler plate in the empty power module slot (Figure 3-5).**

3. **Tighten the 2 captive screws until the power filler plate is seated firmly.**

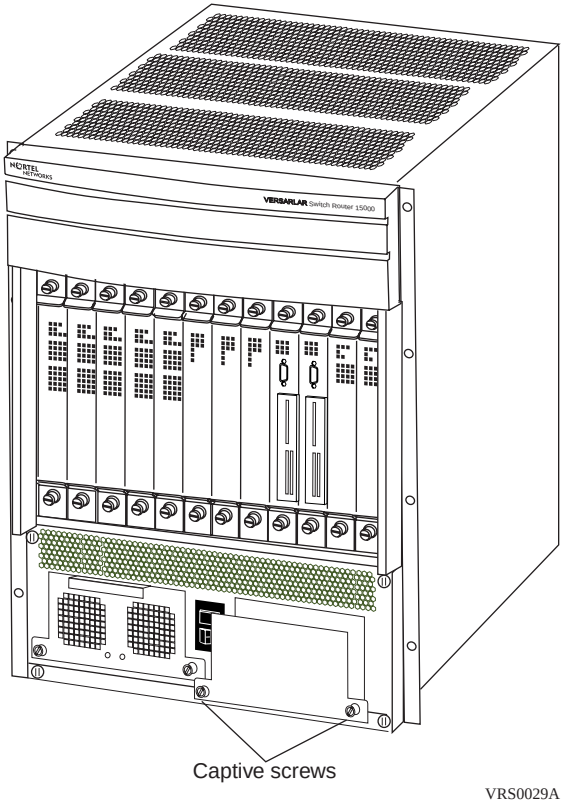


Figure 3-5. Removing or Installing a Power Filler Plate

The DC Power Module

To install a DC power module:

1. **Make sure that the circuit breaker is turned on.**
2. **Verify that the input voltage cable is connected at the back of the chassis.**
3. **Remove the bottom front bezel (see "Power Modules" on page 3-1).**

4. **Attach the antistatic wrist strap.**

   For instructions, see "Attaching the Antistatic Wrist Strap" on page 4-3.

5. **If you are adding a second power module, remove the power filler plate from the redundant power slot (see "Removing and Installing a Power Filler Plate" on page 3-7).**

Caution: Save the power filler plate in case you need to operate the Versalar 15000 with a power module removed.

---

6. **If you are replacing a failed power module, remove the failed module.**

7. **Grasp the handle of the replacement module, guide the module into the desired slot along the side guides, and *gently* insert the module (Figure 3-6).**

8. **Using a flat-tip screwdriver, tighten the 2 captive screws until the power module is seated firmly.**

   When you insert an operational second power module into the Versalar 15000 with the power on, both LEDs on the power module turn on. At the same time, the Versalar 15000 automatically redistributes the load between the two power modules.

9. **Replace the bezel (see "Power Modules" on page 3-1).**

If neither of the two LEDs on the power module turns on, contact the Nortel Networks Technical Solutions Center.

Removing a DC Power Module

If you are installing a second power module, go to "The DC Power Module" on page 3-8.

You can remove a power module with the power on or off.

Caution: To maintain proper cooling, never operate the Versalar 15000 with an empty power module slot. If you are replacing a failed second power module and you do not have a power supply filler module, leave the failed power module installed until a replacement power module is available.

To remove a power module:

1. **Remove the bottom front bezel.**
2. **Using a flat-tip screwdriver, loosen the 2 captive screws that fasten the power module to the chassis until the power module disengages (Figure 3-6).**

Warning: The sides of the power module are hot when you remove the power module from a Versalar 15000 that has been operating recently. Hold the power module by the bottom.

3. **Grasp the handle with both hands and pull the power module out of the Versalar 15000.**

   You can remove an operational power module without affecting the operation of the Versalar 15000. When you remove a power module, the LEDs on the power module turn off, and the Versalar 15000 automatically redistributes the load to the remaining power module.

4. **Install a new power module (see "The DC Power Module" on page 3-8) or install a power filler module (see "Removing and Installing a Power Filler Plate" on page 3-7).**

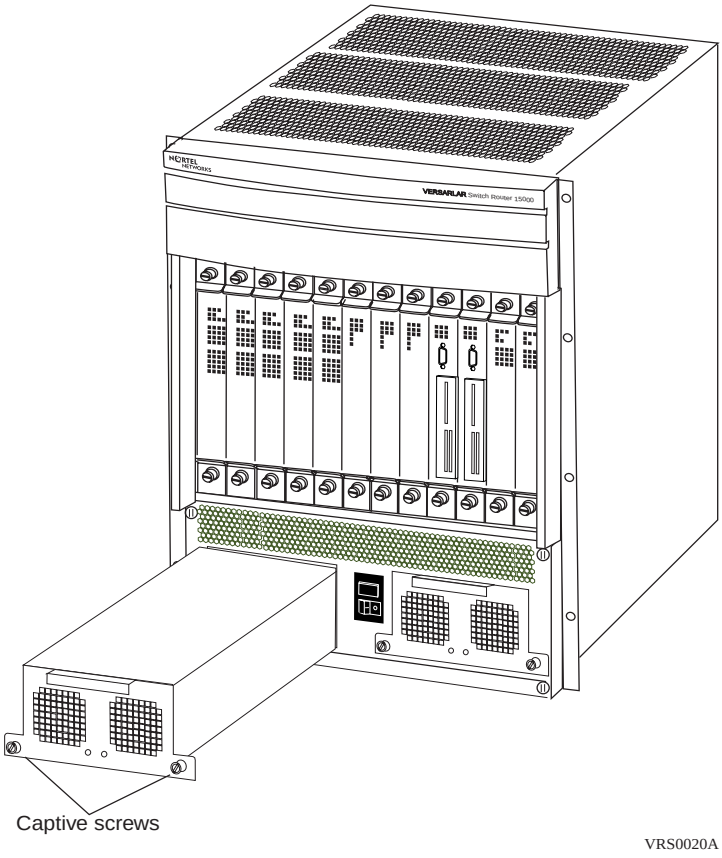


Figure 3-6. Removing or Installing a DC Power Module

Connecting to the DC Power Source

Danger: Due to high-energy hazards, only qualified service personnel are permitted to connect the Versalar 15000 to the DC power source.

The Versalar 15000 supports two DC power supply modules. The second power supply module provides redundancy. To operate in redundant mode, both circuit breakers must be in the on (1) position.

When operating with redundant DC input, the power source with the greater input voltage provides power during normal operations, and the power source with the lesser input voltage functions as the standby.

Danger: Power to the input power cables must be disconnected before these cables are connected or disconnected from the Versalar 15000.

To connect the Versalar 15000 to the DC power source:

1. **Make sure that both circuit breakers on the Versalar 15000 are in the off (0) position (Figure 3-7).**

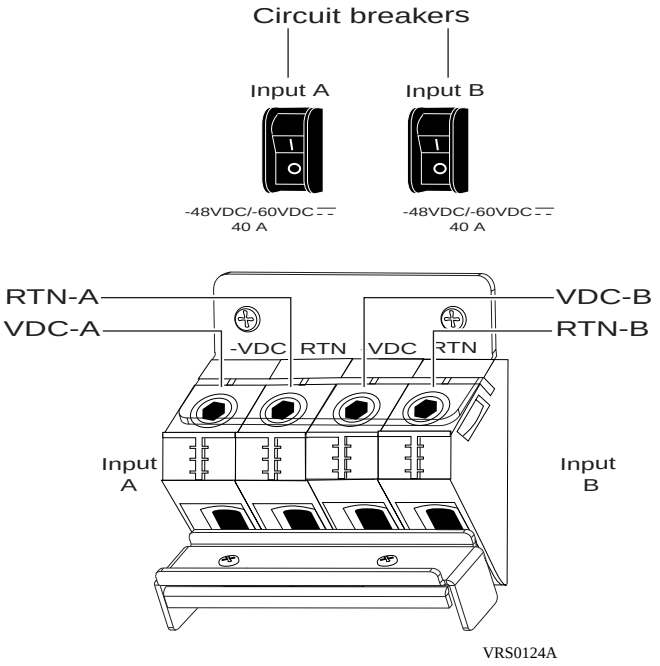


Figure 3-7. Terminal Block and Circuit Breakers on the Back of the Versalar 15000

2. **Using a Phillips screwdriver, remove the 2 screws that secure the terminal block cover to the power module (Figure 3-8).**

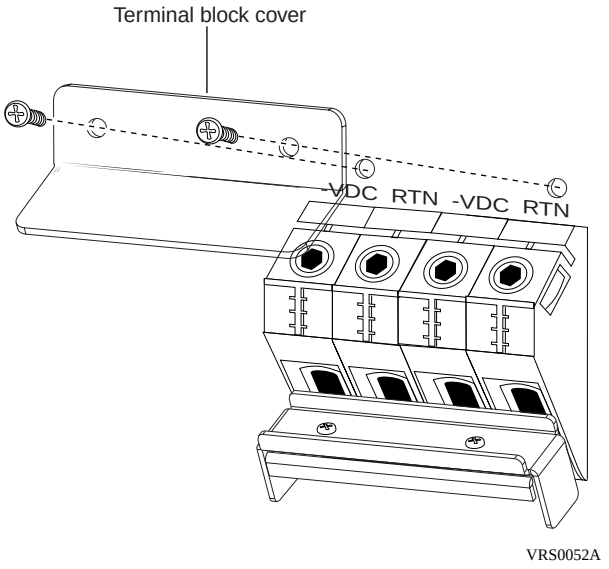


Figure 3-8. DC Power Terminal Block and Power Switch

3. **Using a Phillips screwdriver, remove the 2 screws that secure the strain relief bracket to the terminal blocks (Figure 3-9).**

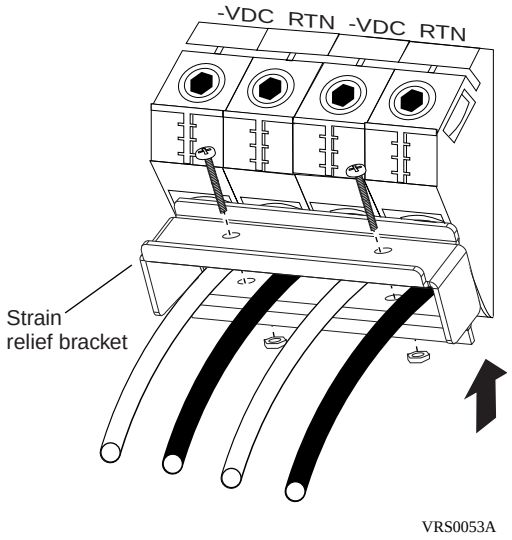


Figure 3-9. Removing the Strain Relief Bracket

4. **Using a 5/32 in. hex wrench, loosen the screws on the terminal blocks (Figure 3-10).**

   If you are connecting to a single power source, loosen the screws on the two terminal block sections on the left labeled Input A in Figure 3-7.

Note: This book refers to the two terminal block sections on the left (Input A) as VDC-A and RTN-A. The two terminal block sections on the right (Input B) are VDC-B and RTN-B.

   If you are connecting to both power sources, loosen the screws on all terminal blocks.

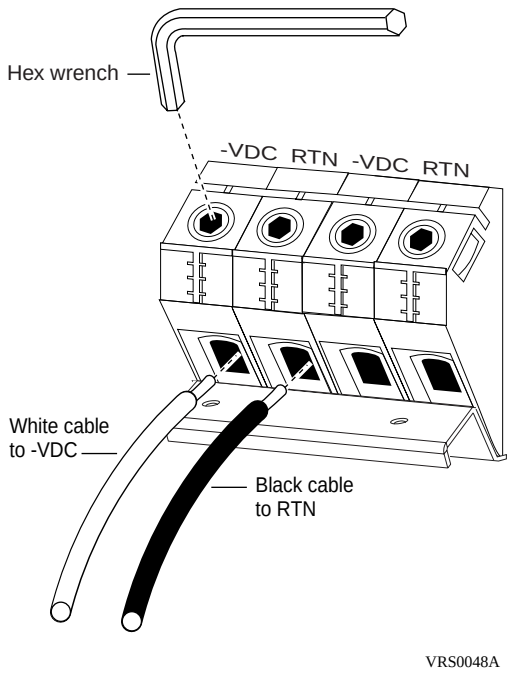


Figure 3-10. Attaching the DC Input Leads

5. **Strip 0.80 in. (20 mm) of insulation from the end of an AWG #2 or #4 wire.**

Note: Although AWG #4 wiring is adequate for the input leads, Nortel Networks recommends AWG #2 to ensure minimal voltage drop from the power source.

6. **Attach the negative lead (-VDC-A input) from the power source to the -VDC terminal block (Figure 3-10).**
7. **Strip 0.80 in. (20 mm) of insulation from the end of an AWG #2 or #4 wire.**
8. **Attach the positive lead (-VDC RTN-A) from the power source to the -VDC RTN terminal block.**
9. **Using a 5/32 in. hex wrench, tighten the 2 screws on the terminal block to establish the electrical connection (Figure 3-10).**

10. **If you are connecting the Versalar 15000 to both power sources, repeat steps 4 through 9 for the other terminal blocks.**

    Use the two terminal block sections on the right (Input B in Figure 3-7) to establish the connection to the second power source.

11. **Attach the earth ground lead to the grounding studs (Figure 3-15 on page 3-26).**

Note: The second pair of grounding studs for the terminal block is optional. You should use the same wire gauge (or greater) for the earth ground lead. If the connection to the power source uses AWG #2 wiring, use AWG #2 wiring for the ground. If the connection to the power source uses AWG #4 wiring, use AWG #4 or #2 wiring for the ground.

12. **Position the strain relief bracket on the terminal block.**
13. **Using a Phillips screwdriver, tighten the screw that fastens the strain relief bracket to the terminal block (Figure 3-11).**
14. **Position the terminal block cover on the terminal block as shown in Figure 3-8 on page 3-14.**
15. **Using a Phillips screwdriver, insert and tighten the 2 screws that fasten the cover to the terminal block.**

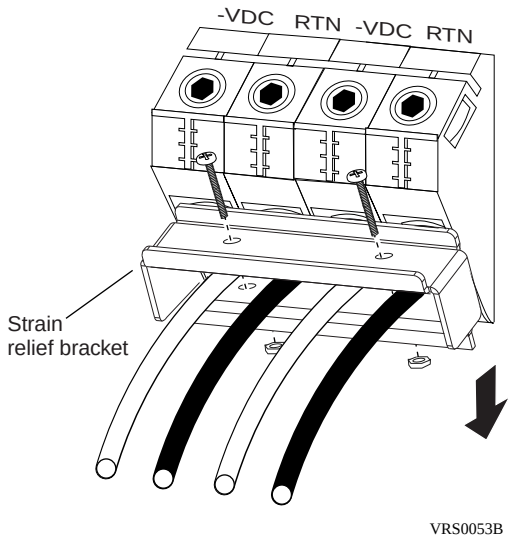


Figure 3-11. Installing the Strain Relief Bracket

Danger: After the Versalar 15000 is connected to the power source, do not remove the input leads. You must disconnect the Versalar 15000 from the power source before removing any wiring.

Installing Optional AC Power Module(s)

The Versalar 15000 ships with a separate optional AC power unit. It contains one or two AC power modules.

You can install an additional AC power module with the power on or off. If two power modules are installed, you can remove one power module without affecting the operation of the hardware platform. You should replace the failed power module as soon as possible to restore high-availability operation.

The operating system generates an event message in response to any change in the status of a power module. These messages identify the power module by its slot. From the front of the Versalar 15000, the AC power module slot 1 is on the left, and power module slot 2 is on the right.

Mounting the Separate AC Power Unit

To use the separate AC power unit, you must mount the unit in a rack beneath the Versalar 15000 chassis.

To mount the AC power unit:

1. **Position the AC power unit against the rack and line up the mounting holes.**
2. **Insert the 4 cagenut screws through the holes in the unit, then into the corresponding holes in the rack (Figure 3-12).**
3. **Secure the unit by tightening each cagenut screw with a Phillips screwdriver.**

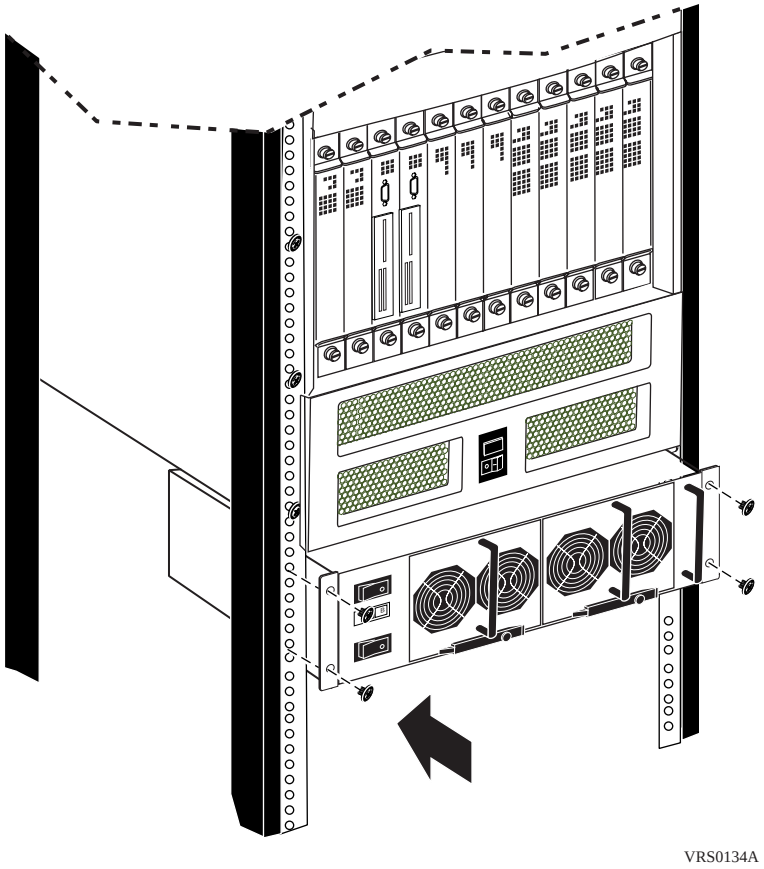


Figure 3-12. Mounting the Separate AC Power Unit

Installing an AC Power Module

To install an AC power module in the separate AC power unit:

1. **Ensure that the circuit breaker is turned on.**
2. **Verify that the input voltage cable is connected at the back of the chassis.**
3. **Attach the antistatic wrist strap.**

   For instructions, see “Attaching the Antistatic Wrist Strap” on page 4-3.
4. **If you are replacing a failed power module, remove the failed module.**

For instructions, see "Removing an AC Power Module" on page 3-22.

5. **Grasp the handle of the replacement module with one hand and the power supply handle with the other (Figure 3-13).**

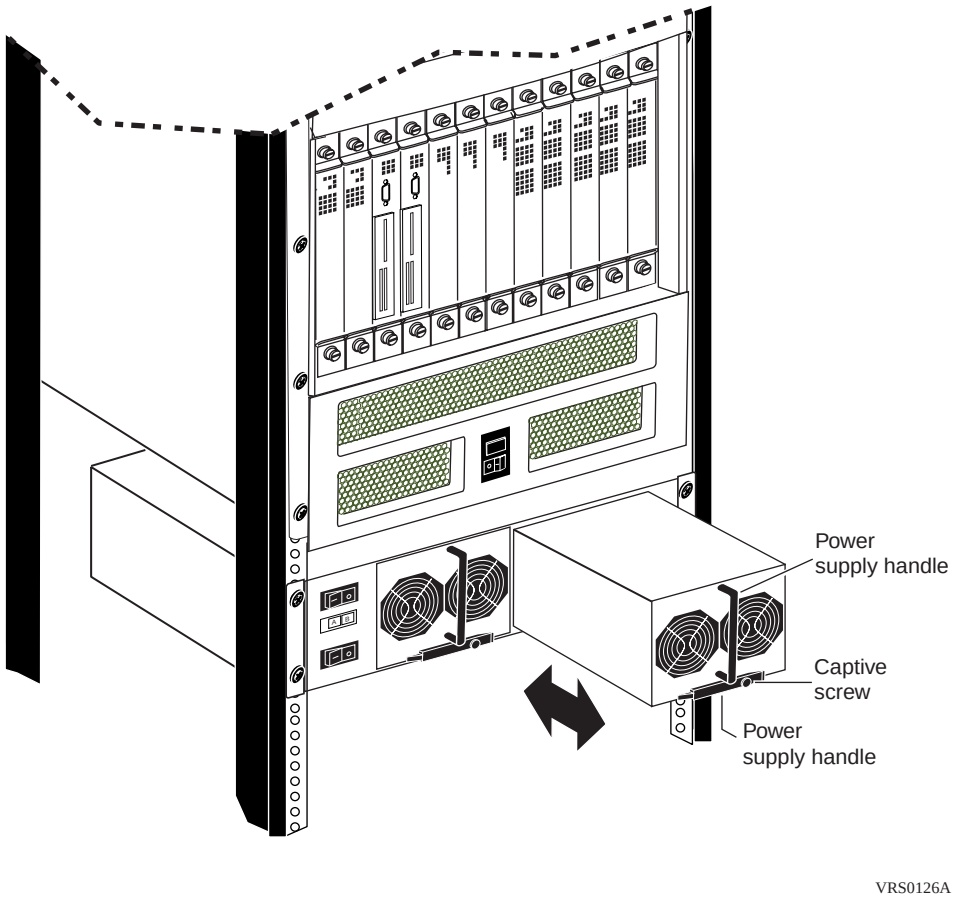


Figure 3-13. Removing or Installing an AC Power Module

6. **Using both hands, gently guide the new power supply module into the desired slot along the side guides.**

7. **Using a flat-tip screwdriver, tighten the captive screw until the power module is seated firmly.**

When you insert an operational second power module into the Versalar 15000 with the power on, both LEDs on the power module turn on. At the same time, the Versalar 15000 automatically redistributes the load between the two power modules.

If neither of the two LEDs on the power module turns on, contact the Nortel Networks Technical Solutions Center.

Removing an AC Power Module

To remove a power module:

1. **Using a flat-tip screwdriver, loosen the captive screw that fastens the power module to the chassis.**
2. **Grasp the latch and gently pull it toward you until the power module disengages (Figure 3-13).**

Warning: The sides of the power module are hot when you remove the power module from a Versalar 15000 that has been operating recently. Hold the power module by the bottom.

3. **Grasp the handle of the power module with your other hand and using both hands, pull the power module out of the separate AC power unit.**

   You can remove an operational power module without affecting the operation of the Versalar 15000. When you remove a power module, the LEDs on the power module turn off, and the Versalar 15000 automatically redistributes the load to the remaining power module.

4. **Install a new power module (see "Installing an AC Power Module" on page 3-20) or install a power filler module (see "Removing and Installing a Power Filler Plate" on page 3-7).**

Connecting to the Optional AC Power Module(s)

AC input power is an optional feature of the Versalar 15000. This option ships with a shelf ready for installation into a 19-inch-wide rack. You can install an additional, redundant power unit in the same shelf. (See *Installing an External AC Power Unit*.)

Figure 3-14 shows two Versalar 15000 platforms, with the AC power unit installed, mounted in a 7-foot four-post rack.

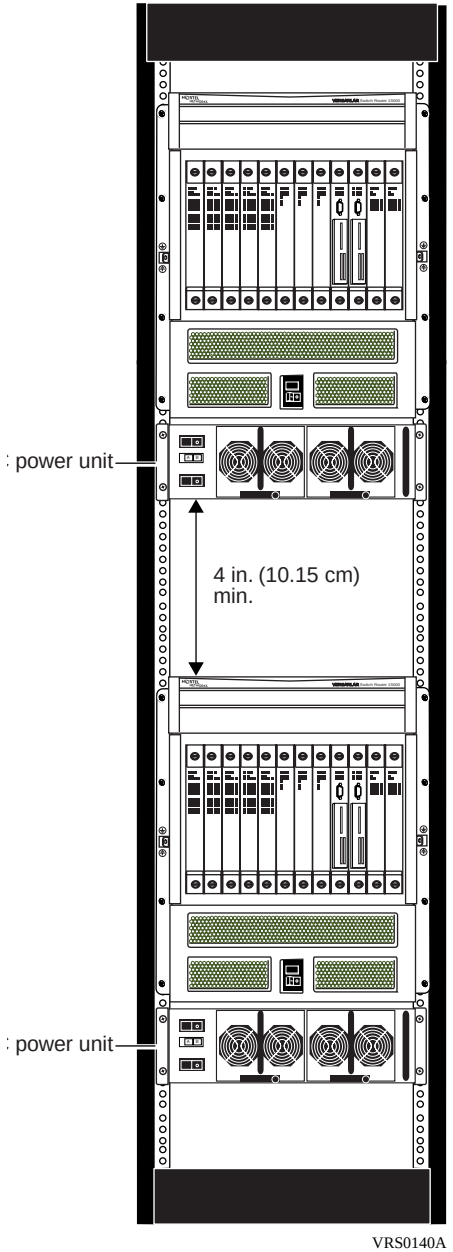


Figure 3-14. Two Versalar 15000 Platforms with the AC Power Unit in a Four-Post Rack

To connect the Versalar 15000 to the optional AC power unit:

1. **Make sure that the AC POWER A and AC POWER B power breakers on the front panel of the separate AC power unit are in the off (0) position.**
2. **Make sure that the DC switch on the front right side of the optional AC power unit is in the off (0) position.**
3. **Connect the power cables to the DC power bars on the back of the AC power unit (Figure 3-15).**
4. **Connect the AC power unit to the DC terminal block (see pages 3-12 to 3-19).**
5. **Connect the AC management cable from the 9-pin D-sub connector on the back of the Versalar 15000 to the separate AC power unit (Figure 3-15). .**

Note: The chassis must be grounded (see Step 11. on page 3-17)

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6. **Make sure that the address switch (SW1) on the back of the AC unit is in the up position (Figure 3-15 on page 3-26).**

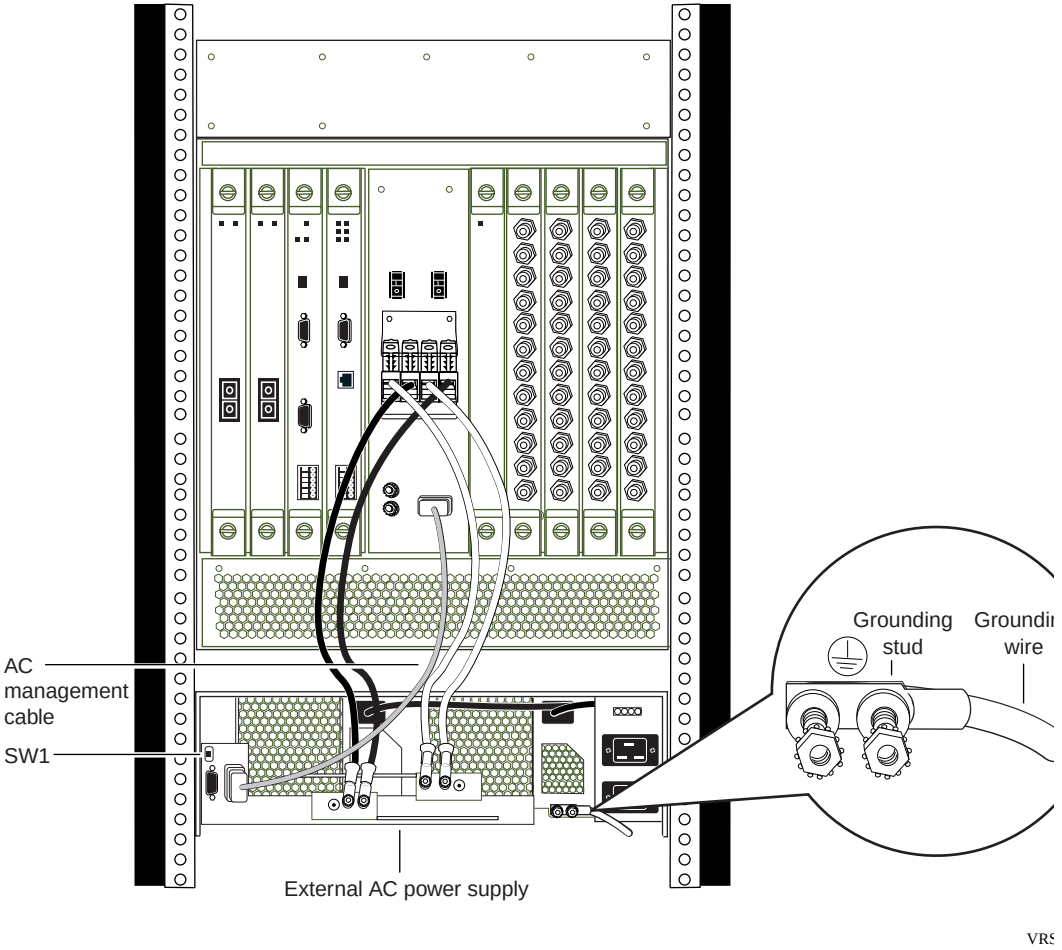


Figure 3-15. AC Management Cable Location

7. **Insert the power plugs on the back of the separate AC power unit into the appropriate power outlet. (See Table 2-5 on page 2-8). Each power supply requires one power cord.**
8. **Turn the AC POWER A and AC POWER B power breakers on the front panel of the separate AC power unit to the on (1) position.**
9. **Turn on the DC output switch on the <u>right</u> side of the unit front panel.**

Chapter 4
Installing Processor and Interface Cards and Connecting Equipment

This chapter provides instructions for adding and replacing Versalar 15000 processor and interface cards. It also discusses connecting communications cables and connecting console and modem equipment. It includes the following topics:

Topic	Page
Location of the Processor and Interface Cards	4-2
Attaching the Antistatic Wrist Strap	4-3
Installing and Replacing a Processor Card	4-6
Installing and Removing an Interface Card	4-12
Connecting Communications Cables	4-19
Connecting Console Equipment	4-25
Connecting a Modem	4-32

Location of the Processor and Interface Cards

Figure 4-1 shows the location of the processor and interface cards. Refer to Chapter 1 for descriptions of configurations of these cards.

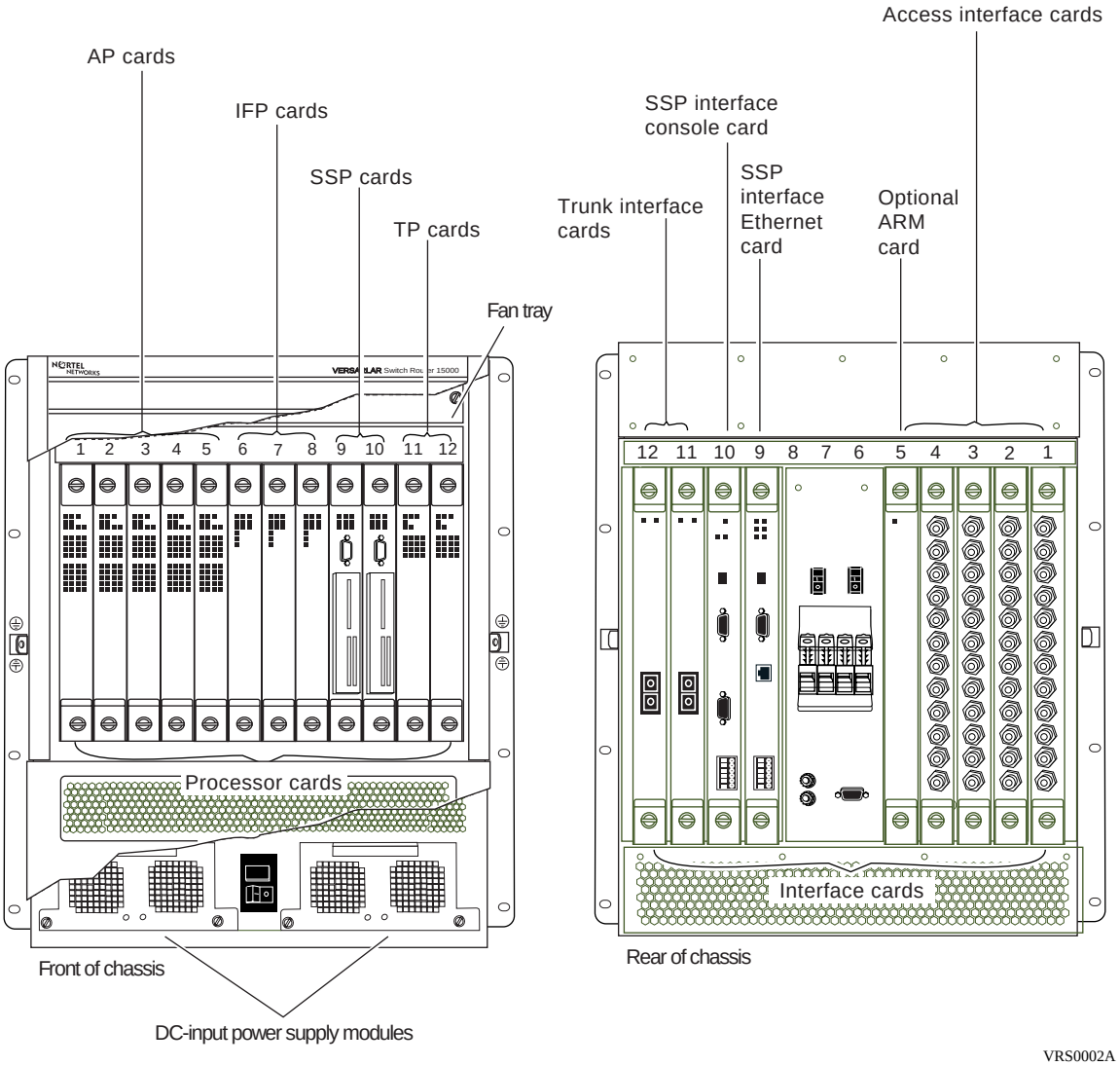


Figure 4-1. Location of the Processor and Interface Cards

Attaching the Antistatic Wrist Strap

The Versalar 15000 ships with an antistatic wrist strap. The antistatic wrist strap directs the discharge of static electricity from your body to the chassis of the router, thereby avoiding discharge to, and possible damage of, sensitive electronic components.

You must wear an antistatic strap whenever you remove, install, and handle processor cards, interface cards, memory cards, or hardware modules such as the fan tray and power supplies.

Caution: Electrostatic discharge can damage hardware. Follow the procedure in this section to protect your equipment from damage.

To attach the antistatic wrist strap:

1. **Locate the antistatic wrist strap in the shipping container.**
2. **Verify that the cable is attached to the wrist strap.**
3. **Place the strap around your wrist.**
4. **Adjust the strap to ensure that the metal buckle inside the strap touches your skin.**
5. **Attach the alligator clip to the ground clip on the front of the chassis (Figure 4-2) or on the back of the chassis (Figure 4-3).**

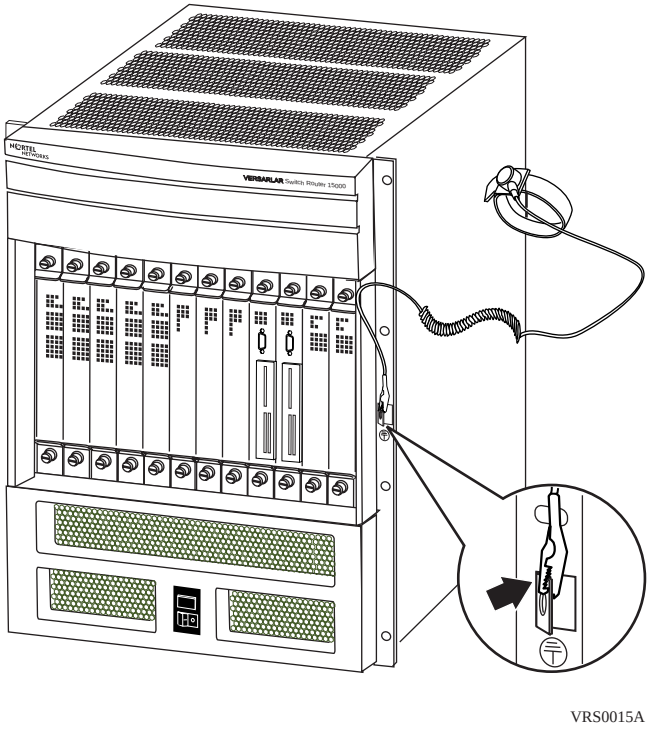


Figure 4-2. Connecting the Wrist Strap Jack to the Front Ground Clip

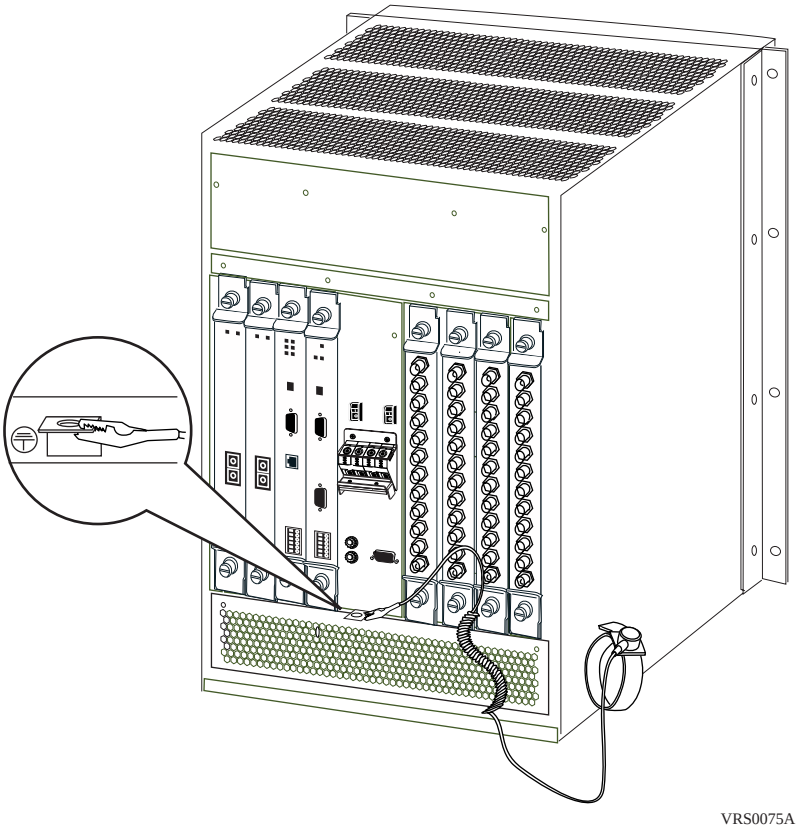


Figure 4-3. Connecting the Wrist Strap Jack to the Back Ground Clip

Installing and Replacing a Processor Card

You can add or replace a processor card with the power on or off.

To replace a processor card, see the next section, "Removing a Processor Card." To install a processor card, see "Installing a Processor Card" on page 4-8.

Removing a Processor Card

You can remove a processor card with the power on or off.

Caution: Do not operate the Versalar 15000 with an empty processor card slot. If you need to replace a failed processor card and you do not yet have a replacement card, leave the failed processor card installed or install an air flow module as originally shipped with the chassis.

To remove a processor card:

1. **Attach the antistatic wrist strap.**

   For instructions, see "Attaching the Antistatic Wrist Strap" on page 4-3.

2. **Disconnect any cables attached to the ports on the processor card.**

3. **Using a flat-tip screwdriver, loosen the 2 captive screws securing the processor card to the chassis (Figure 4-4).**

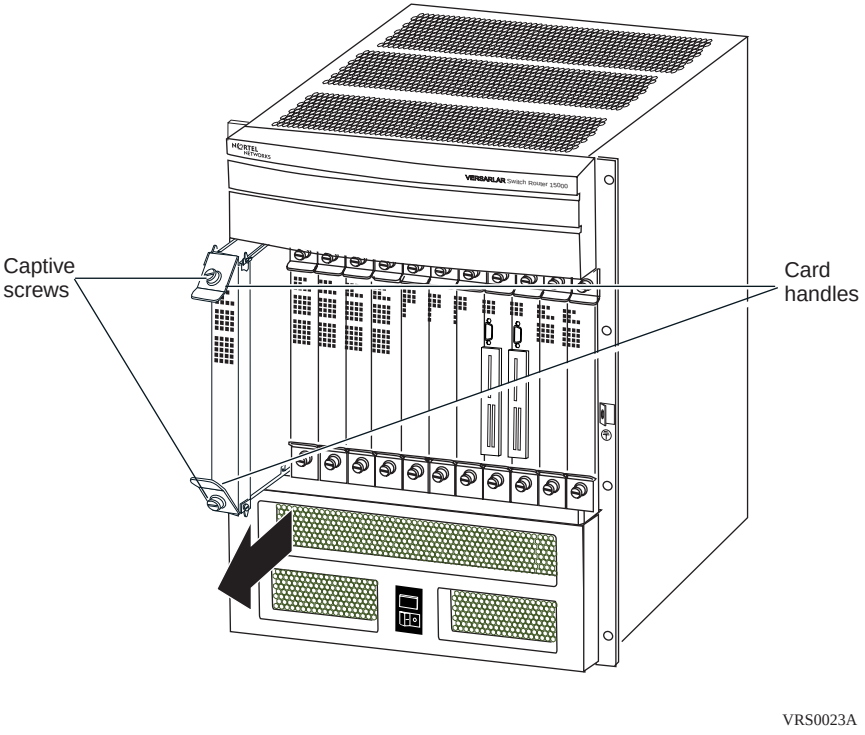


Figure 4-4. Removing a Processor Card

4. **Pull on both card handles until the processor card ejects from the chassis.**
5. **Rest the edge of the processor card on the palm of one hand, and with the other hand, pull the card out of the chassis.**
6. **If you are installing a replacement processor card, go to the next section. Otherwise, install an air flow module.**

Installing a Processor Card

You can install a processor card with the power on or off.

Caution: Electrostatic discharge can damage hardware. Attach the antistatic wrist strap before handling any Versalar 15000 components.

To install a processor card:

1. **Attach the antistatic wrist strap.**

   For instructions, see "Attaching the Antistatic Wrist Strap" on page 4-3.

2. **Locate the slot where you want to install the processor card (Figure 4-5).**

3. **Remove the air flow module.**

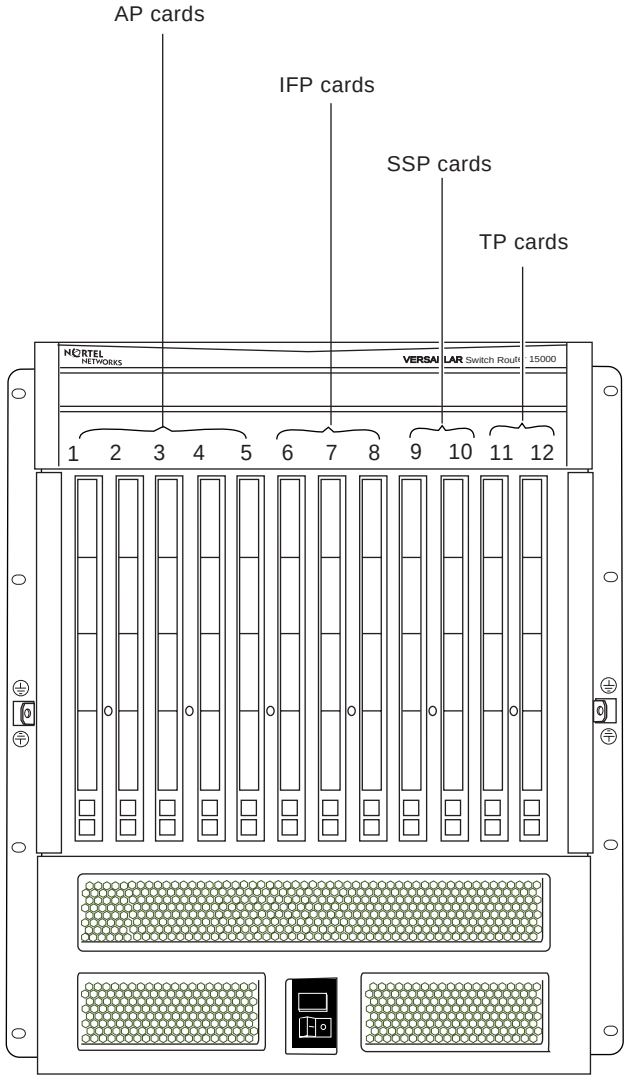


Figure 4-5. Processor Card Slots (Front of Chassis)

4. **Holding the processor card by its top and bottom edges, orient the card so that the EMI card shield is on the left (Figure 4-6).**

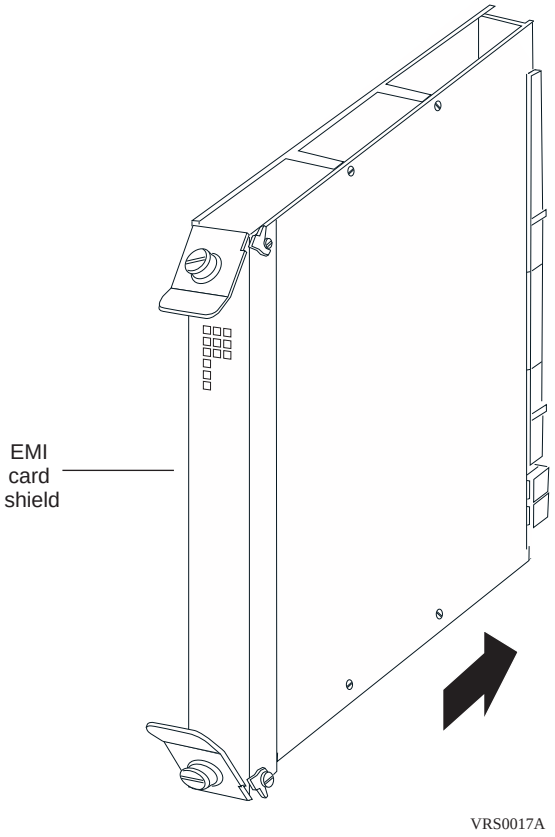


Figure 4-6. Positioning a Processor Card

5. **Align the processor card with the chassis slot arrows above and below the card slot.**
6. **Holding the card handles open, slide the processor card into the slot using the slot card guides (Figure 4-7).**

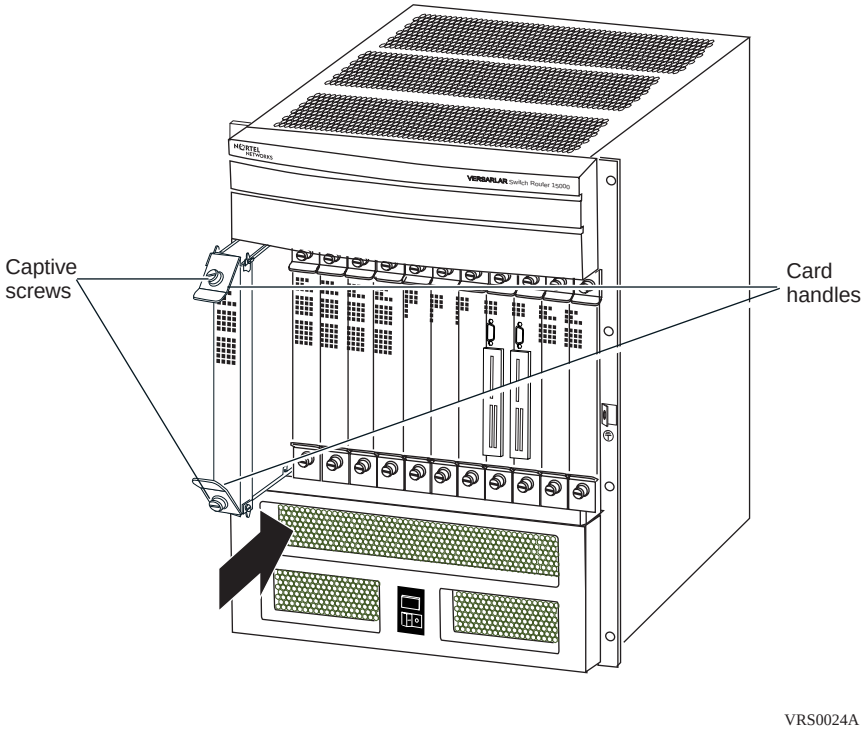


Figure 4-7. Installing a Processor Card

7. **Insert the card until its connector panel touches the Versalar 15000 back panel.**
8. **Press both card handles in at the same time until the card moves further into the chassis.**
9. **Using a flat-tip screwdriver, tighten the 2 captive screws to secure the processor card to the chassis.**

10. **Connect the cables to the card.**

    For instructions, see "Connecting Communications Cables" on page 4-19.

Note: The chassis contains a hot-swap switch integrated in the ejector lever. Make sure that both captive fasteners are tight for proper operation.

Installing and Removing an Interface Card

You can add or replace an interface card with the power on or off.

To replace an interface card, see the next section, "Removing an Interface Card." To install an interface card, see "Installing an Interface Card" on page 4-14.

Removing an Interface Card

You can remove an interface card with the power on or off.

Caution: Do not operate the Versalar 15000 with an empty interface card slot. If you need to replace a failed interface card and you do not yet have a replacement card, leave the failed interface card installed or install an air flow module.

To remove an interface card:

1. **Attach the antistatic wrist strap.**

   For instructions, see "Attaching the Antistatic Wrist Strap" on page 4-3.

2. **Disconnect any cables attached to the ports on the interface card.**

3. **Using a flat-tip screwdriver, loosen the 2 captive screws securing the interface card to the chassis (Figure 4-8).**

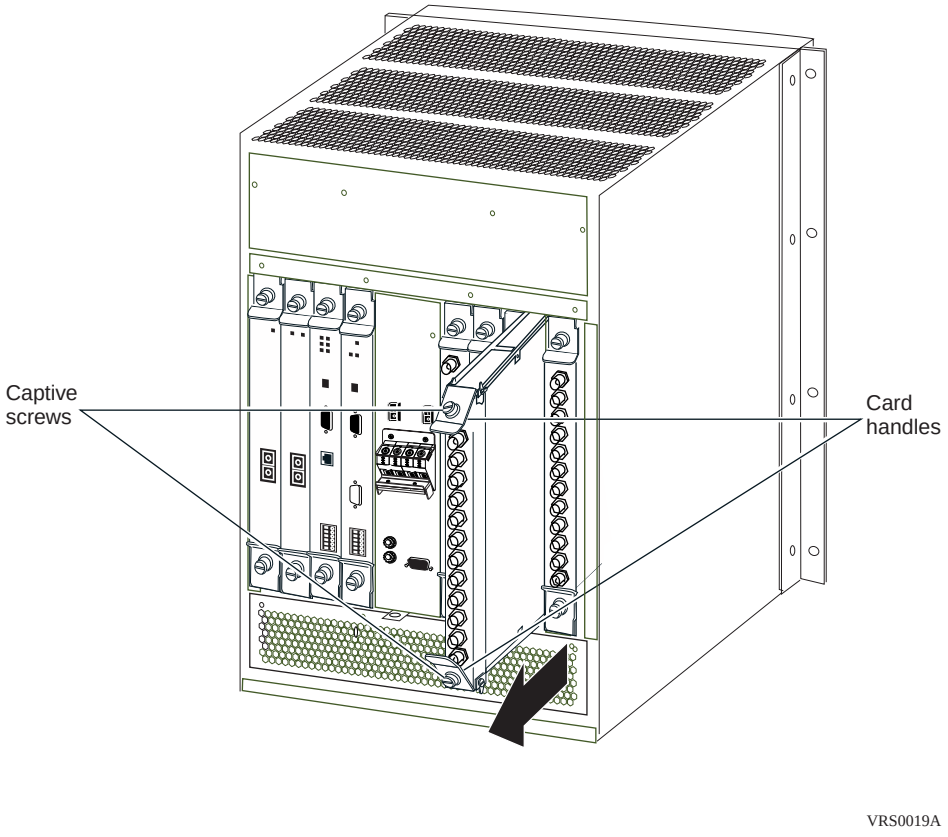


Figure 4-8. Removing an Interface Card

4. **Pull on both card handles until the interface card begins to come out of the chassis.**
5. **Rest the edge of the interface card on the palm of one hand, and with the other hand, pull the card out of the chassis.**
6. **If you are installing a replacement interface card, go to the next section. Otherwise, install an air flow module.**

Installing an Interface Card

You can install an interface card with the power on or off.

Caution: Electrostatic discharge can damage hardware. Attach the antistatic wrist strap before handling any Versalar 15000 components.

To install an interface card:

1. **Attach the antistatic wrist strap.**

   For instructions, see "Attaching the Antistatic Wrist Strap" on page 4-3.

2. **Locate the slot where you want to install the interface card (Figure 4-9).**

3. **If an interface card air flow module is installed in the slot, remove it.**

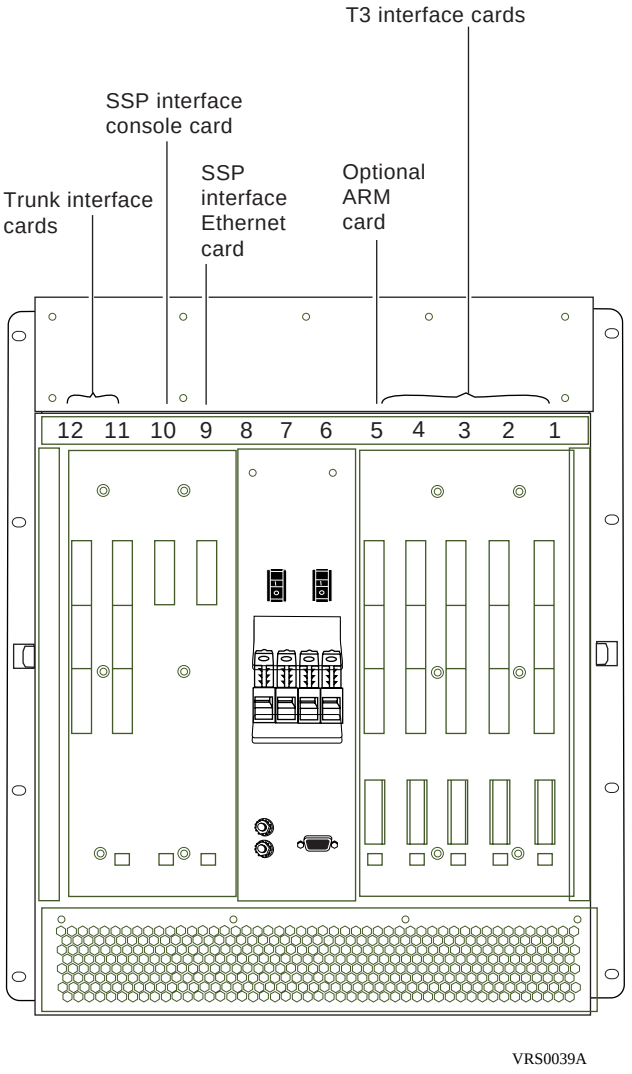

T3 interface cards
SSP interface console card
SSP interface Ethernet card
Optional ARM card
Trunk interface cards
12 11 10 9 8 7 6 5 4 3 2 1
VRS0039A

Figure 4-9. Interface Card Slots (Back of Chassis)

4. **Holding the interface card by its top and bottom edges, orient the card so that the EMI card shield is on the right (Figure 4-10).**

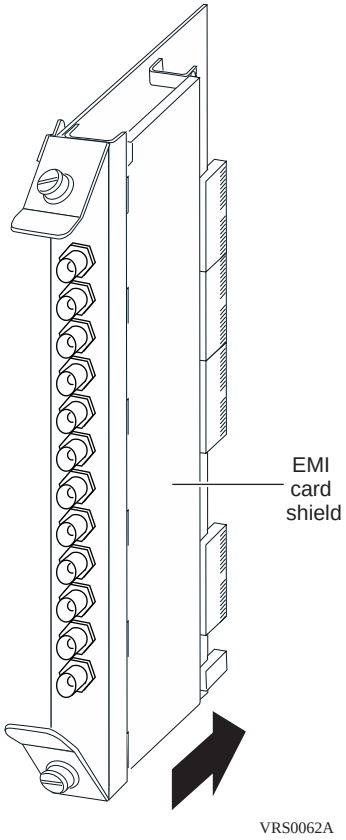


Figure 4-10. Positioning an Interface Card

5. **Align the interface card with the chassis slot arrows above and below the card slot.**
6. **Holding the card handles open, slide the interface card into the slot using the card guides (Figure 4-11).**
7. **Insert the card until its connector panel touches the Versalar 15000 back panel.**

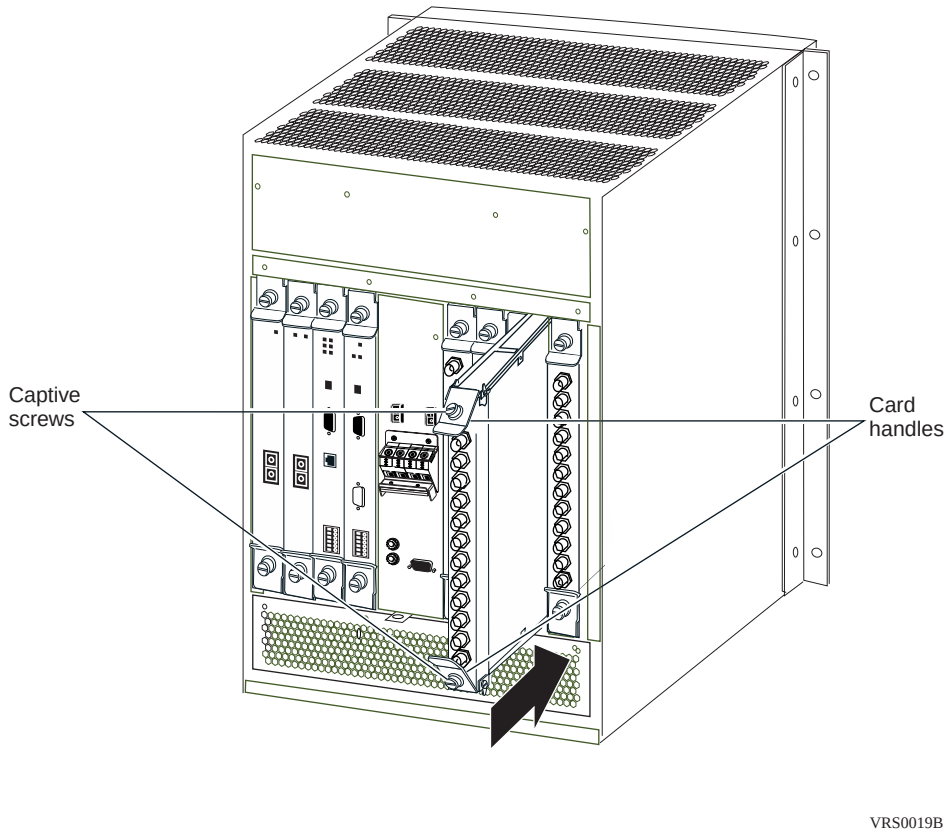


Figure 4-11. Installing an Interface Card

8. **Press both card handles in at the same time until the card moves further into the chassis.**
9. **Using a flat-tip screwdriver, tighten the 2 captive screws to secure the interface card to the chassis.**

10. Connect the cables to the card.

For instructions, see “Connecting Communications Cables” on page 4-19 and “Connecting Console Equipment” on page 4-25.

Note: The chassis contains a hot-swap switch integrated in the ejector lever. Ensure that both captive fasteners are tight for proper operation.

Connecting Communications Cables

Gather the communications equipment and cables that you will attach to the Versalar 15000. If you do not have the proper cables, contact your network administrator.

This section includes the following topics:

Topic	Page
Connecting to an Ethernet Interface	4-20
Connecting to an OC-12c/STM-4c or an OC-3 ATM Access Interface	4-21
Connecting to a T3 Interface	4-22
Connecting to an Alarm	4-24

Refer to Chapter 1, “Versalar 15000 Hardware Description” for information about the locations of the modules in the chassis.

Connecting to an Ethernet Interface

The SSP interface Ethernet card provides a 10BASE-T UTP port.

To connect a UTP cable to the 10BASE-T port, insert the cable into the RJ-45 receptacle connector (Figure 4-12).

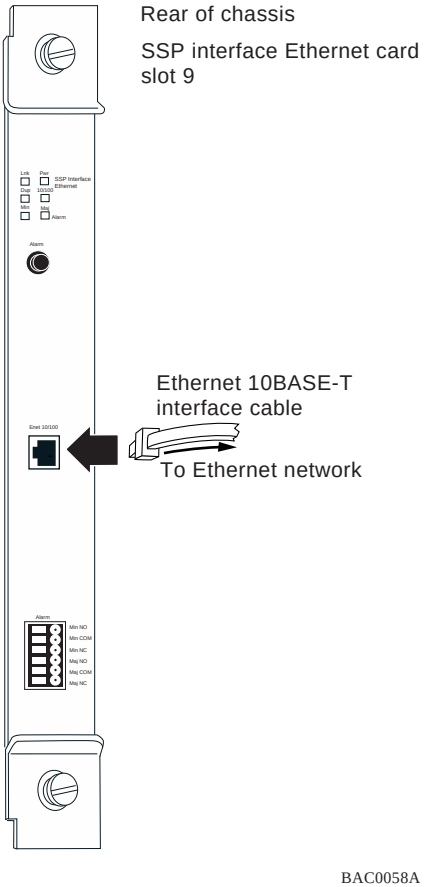


Figure 4-12. Connecting a UTP Cable to the SSP Interface Ethernet Card

Connecting to an OC-12c/STM-4c or an OC-3 ATM Access Interface

To connect to an OC-12c/STM-4c or an OC-3 ATM access interface, insert the fiber optic cable into the connector on the OC-12c/STM-4c or Dual OC-3 (SM or MM) ATM access interface card (Figure 4-13).

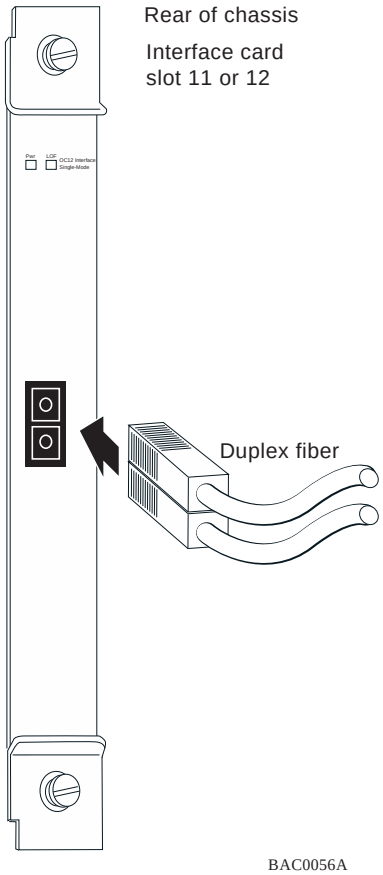


Figure 4-13. Connecting a Duplex Fiber Cable to the OC-12c/STM-4c or OC-3 Interface Card

Connecting to a T3 Interface

Figure 4-14 shows the transmit and receive connector pairs for each of the six ports on a T3 interface card.

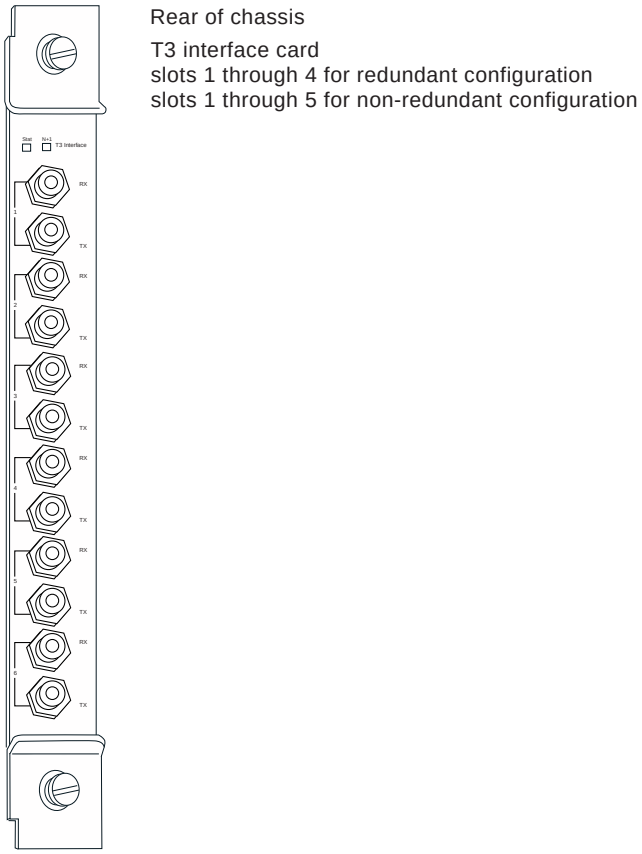


Figure 4-14. T3 Interface Card Connector Pairs

To lock a coaxial cable to the T3 connector:

1. **Gently push the coaxial cable onto the T3 connector (Figure 4-15).**
2. **Turn the coaxial cable to the left until the key on the T3 connector clicks into the notch on the coaxial cable.**
3. **Bundle the cables for each slot to facilitate card installation and removal.**

   Refer to your cable management policy for bundling information.

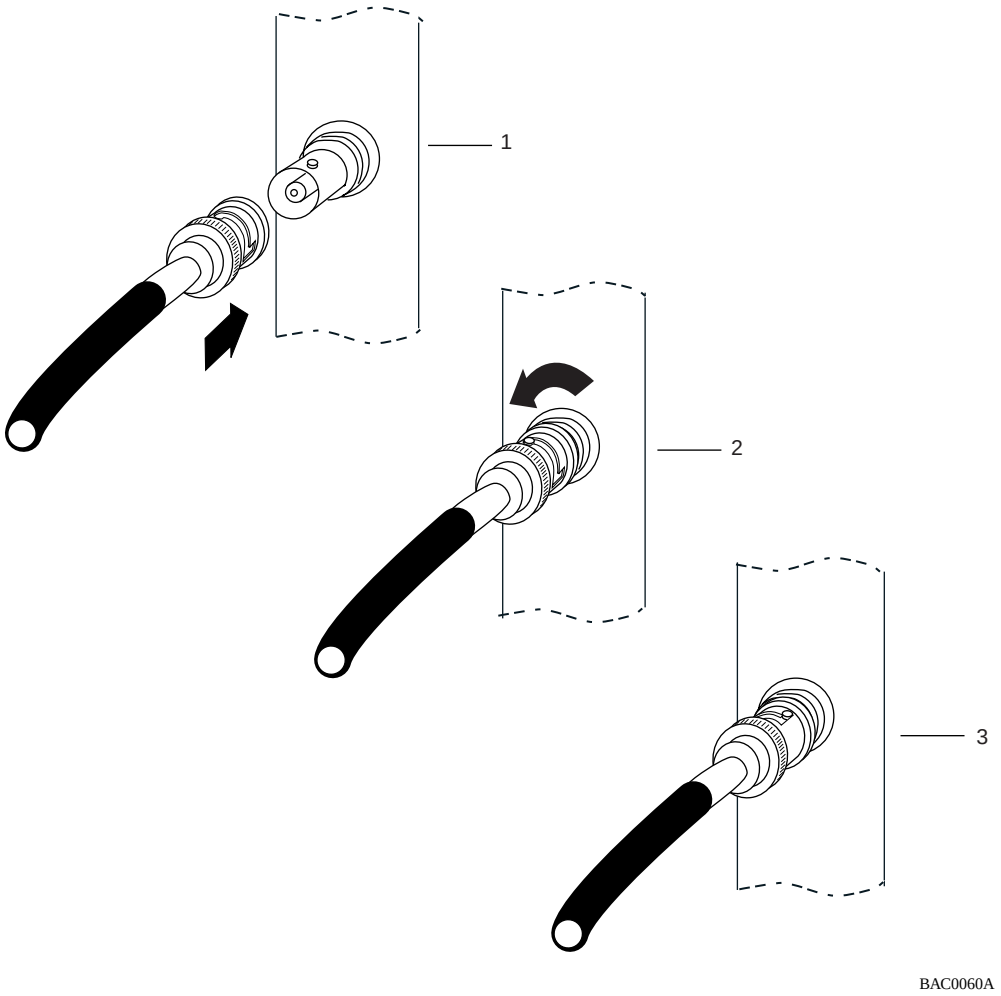


Figure 4-15. Connecting a Coaxial Cable to the T3 Interface Card

Connecting to an Alarm

You can connect an alarm to the Versalar 15000 using the SSP interface Ethernet and the SSP interface console cards.

The major and minor alarms provide connection to normally open (NO) and normally closed (NC) relay contacts. When the Versalar 15000 logs certain fault event messages, such as component failure, loss of power, or loss of signal, the alarm relay activates an external visible or audible alarm.

Alarm contact ratings are 48 VDC at 1.5 A maximum or 60 VDC at 1.2 A maximum.

To connect to an alarm:

1. **Using a 1/8 in. flat-tip screwdriver, loosen the screw on the terminal block on the SSP interface Ethernet card or the SSP interface console card for the connection that you are making (Figure 4-16).**

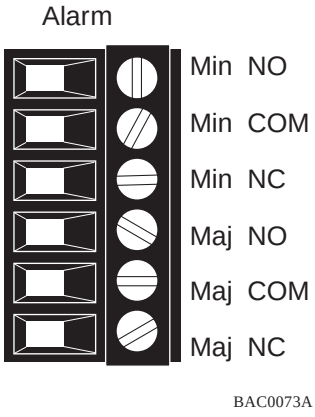


Figure 4-16. Alarm Terminal Block on the SSP Interface Cards

2. **Strip 1/2 in. (10 mm) of insulation from the end of an AWG wire (#22 to #16).**
3. **Insert the wire into the alarm terminal block connector.**
4. **Using the screwdriver, tighten the screw on the terminal block to establish the connection.**
5. **Connect the other end of the alarm cable to the alarm.**

Connecting Console Equipment

You use the Bay Command Console (BCC) to customize your Versalar 15000 configuration (for example, by editing IP parameters). To establish a local BCC session, you must connect the Versalar 15000 to a PC or to a VT-100 console.

Complete the steps in one of the following sections:

Topic	Page
Connecting a PC with a 25-pin Comm Port to the Console Port	4-25
Connecting a Terminal with a 25-pin Comm Port to the Console Port	4-29
Connecting a PC with a 9-pin Comm Port to the Console Port	4-31
Connecting a Modem	4-32

Connecting a PC with a 25-pin Comm Port to the Console Port

To connect a PC to the console port, you need the following items, which are shipped with the Versalar 15000:

- Serial console cable with 9-pin receptacle to 25-pin plug connectors (Order No. 110307)
- Null modem crossover adapter with two 25-pin receptacle connectors (Order No. 110308)

You may optionally use another standard AT serial cable with a 25-pin plug connector to extend the total cable length between the console and the PC.

When you have the correct equipment, complete the following steps:

1. **Turn on and configure a comm port on the PC, using the parameters in Table 4-1.**

   Refer to the PC user manual for instructions.

Table 4-1. PC Parameters

Parameter	Value
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

2. **Insert the 9-pin receptacle end of the console cable into the console connector on the SSP interface console card (Figure 4-17).**

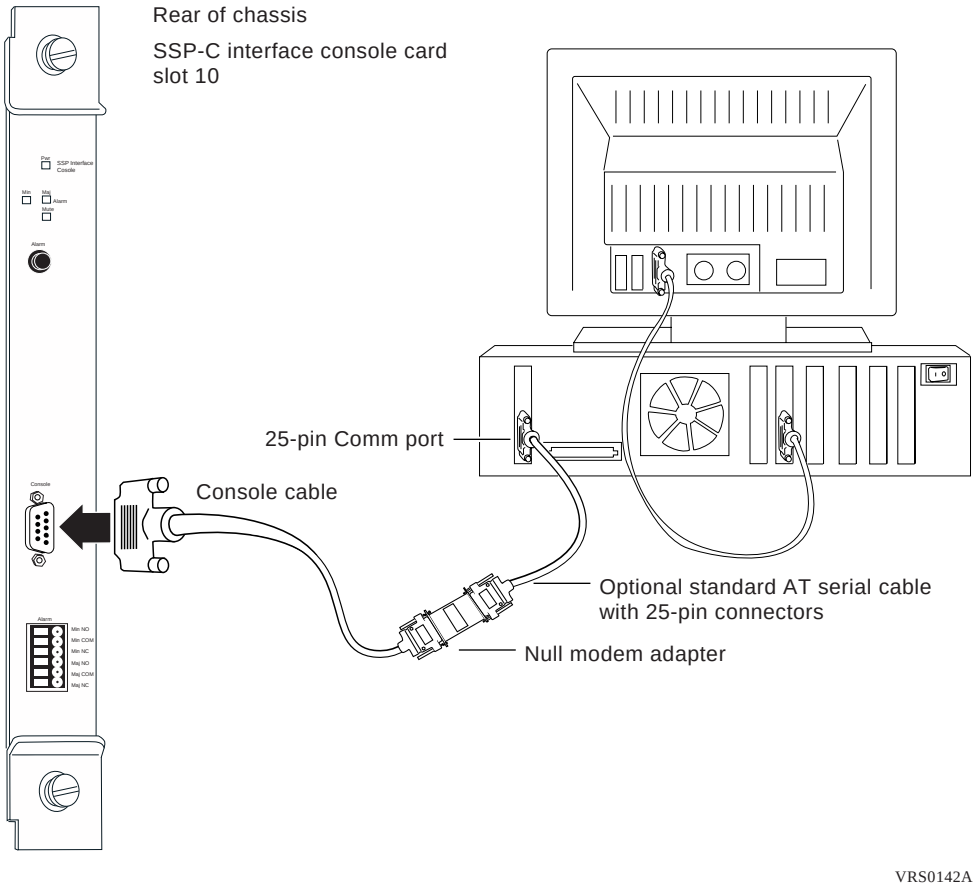


Figure 4-17. Connecting the Console Cable to a PC with a 25-pin Comm Port

3. **Attach one end of the null modem crossover adapter to the 25-pin plug connector on the console cable, then tighten the screws (Figure 4-18).**

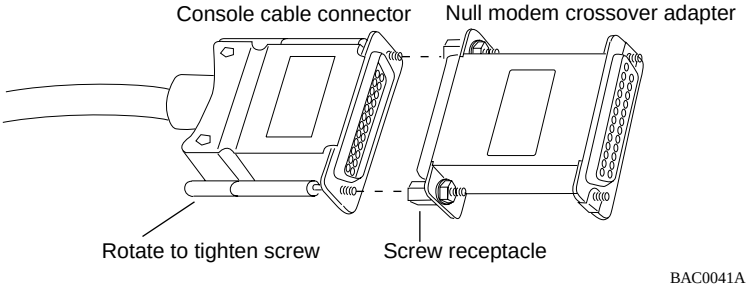


Figure 4-18. Attaching the Null Modem Crossover Adapter

4. **Attach the 25-pin receptacle end of the console cable-plus-adapter to the optional standard AT serial cable, if desired.**
5. **Connect the complete cable unit to a serial communications port on the back of the PC (Figure 4-17).**

Connecting a Terminal with a 25-pin Comm Port to the Console Port

To connect a terminal to the console port, you need the following items, which are shipped with the Versalar 15000:

- Serial console cable with 9-pin receptacle to 25-pin plug connectors (Order No. 110307)
- Null modem crossover adapter with two 25-pin receptacle connectors (Order No. 110308)

To connect a terminal to the Versalar 15000:

1. **Turn on and configure the terminal, using the parameters in Table 4-2.**

   Refer to the terminal user manual for instructions.

Table 4-2. Terminal Parameters

Parameter	Value
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

2. **Insert the 9-pin receptacle end of the console cable into the console connector on the SSP interface console card (Figure 4-19).**

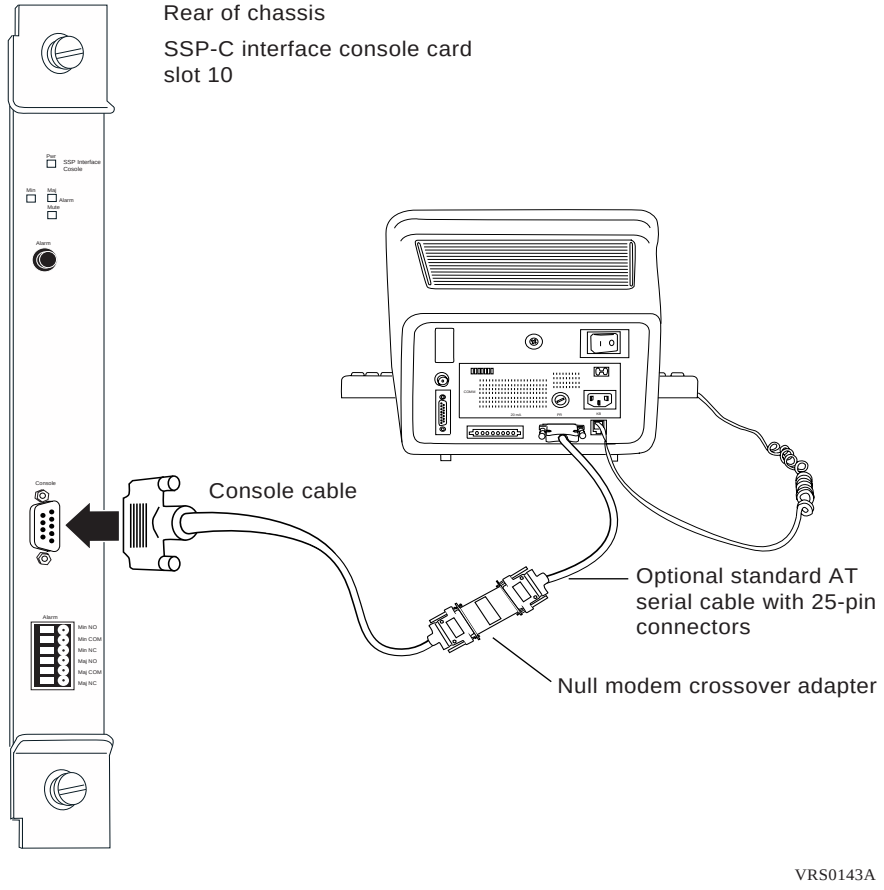

Rear of chassis
SSP-C interface console card slot 10
Console cable
Optional standard AT serial cable with 25-pin connectors
Null modem crossover adapter
VRS0143A

Figure 4-19. Connecting a Console Cable to a Terminal with a 25-pin Comm Port

3. **Attach one end of the null modem crossover adapter to the 25-pin plug connector on the console cable, then tighten the screws. Refer to Figure 4-18 on page 4-28.**
4. **Attach the 25-pin receptacle end of the console cable-plus-adapter to the optional standard AT serial cable, if desired (Figure 4-19).**
5. **Connect the complete cable unit to the terminal's comm port connector (Figure 4-19).**

Connecting a PC with a 9-pin Comm Port to the Console Port

To connect a PC to the console port, you need the following item, which is shipped with the Versalar 15000:

- Serial console cable with 9-pin receptacle connectors (Order No. 117296-A)

When you have the correct equipment, complete the following steps:

1. **Turn on and configure a comm port on the PC, using the parameters in Table 4-1.**

   Refer to the PC user manual for instructions.

Table 4-3. PC Parameters

Parameter	Value
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

2. **Insert the 9-pin receptacle end of the console cable into the console connector on the SSP interface console card (Figure 4-20).**

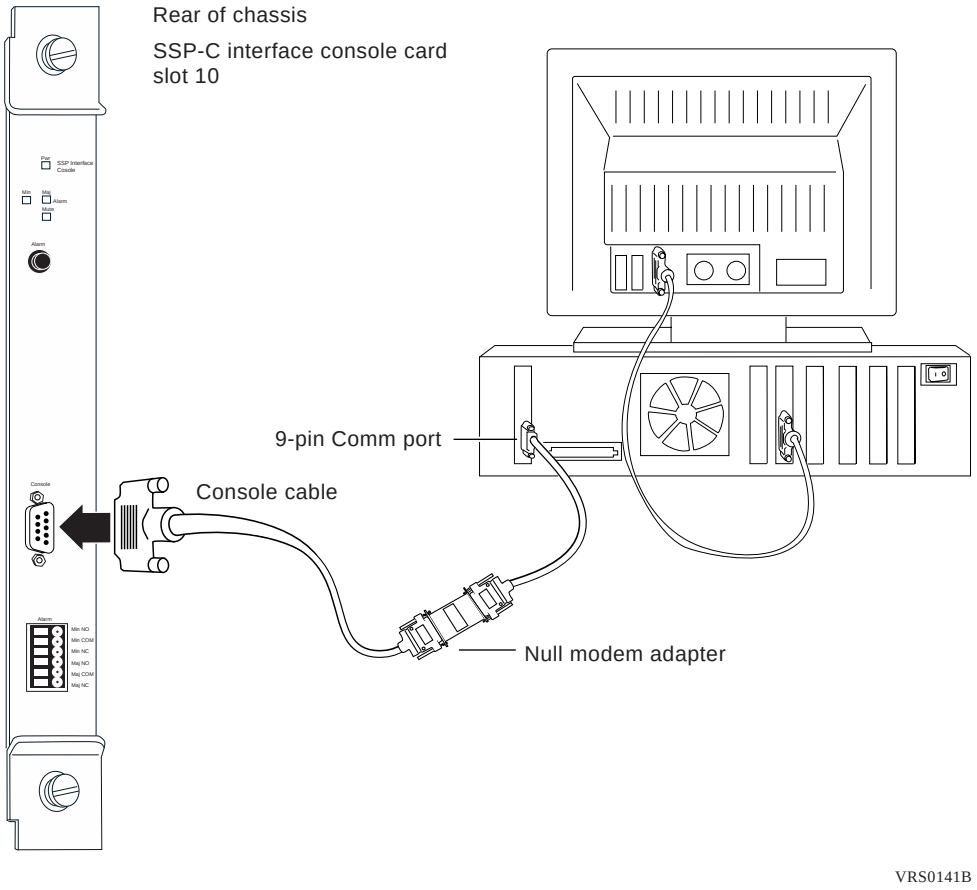


Figure 4-20. Connecting the Console Cable to a PC with a 9-pin Comm Port

3. **Attach the 9-pin plug end of the cable to the serial communications port on the back of the PC (Figure 4-20).**

Connecting a Modem

If you need remote dial-in access to the BCC, you can connect a modem (AT or Hayes compatible) to the Versalar 15000 SSP card using the console cable shipped with the Versalar 15000.

To connect a modem to the Versalar 15000:

1. **Turn on and configure the modem, using the parameters in Table 4-4.**

   Refer to the modem documentation for instructions.

Table 4-4. Modem Settings

Setting	Value
Clear to send (CTS) signal	On
Data terminal ready (DTR) signal	Modem will only connect if the DTR signal is present. If the DTR signal is not present, the modem will disconnect.
Data carrier detect (DCD) or received line signal detection (RLSD)	On while the carrier is present. The Versalar 15000 uses DCD to detect modem connect and disconnect.
Data set ready (DSR) signal	On
Ready to send (RTS) signal	Ignored
Synchronous/asynchronous mode	Asynchronous
Auto answer	Answer on two rings when DTR is active.
Local character echo	Off
Supervisory functions	Off
Baud rate	9600
Data bits	8
Stop bits	1
Parity	None

2. **Insert the 9-pin receptacle end of the console cable (Order No. 110307) into the modem connector on the SSP card (Figure 4-21).**

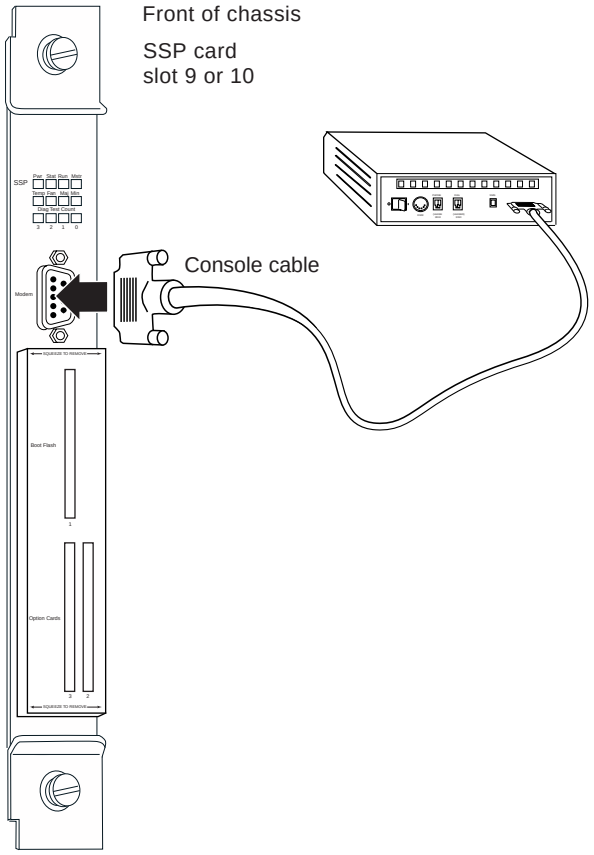


Figure 4-21. Connecting a Modem to the Versalar 15000

3. **Insert the 25-pin plug connector at the other end of the console cable into the modem's RS-232 data communications port.**

Two SSP cards, each with a modem, can share the same dial-up line (Figure 4-22). The data terminal ready (DTR) signal on the modem port follows the active SSP card. Only the modem that is attached to the active SSP card answers the phone.

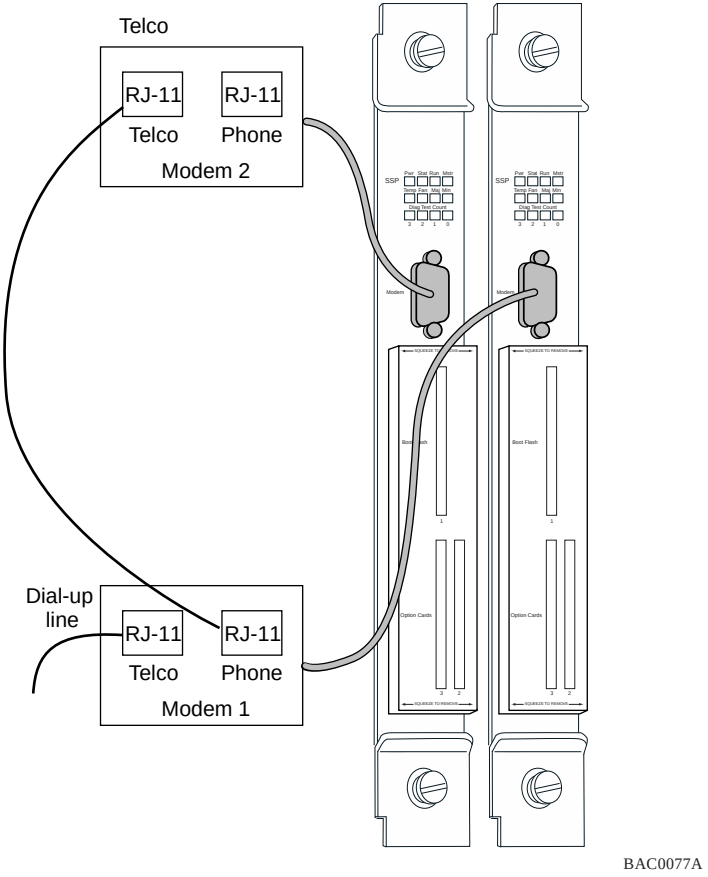


Figure 4-22. Dual Modem Access with a Single Telco Line

Chapter 5
Operating the Versalar 15000

This chapter describes some of the routine tasks of operating the Versalar 15000. It includes the following topics:

Topic	Page
Verifying a Successful Installation	5-2
Turning the Versalar 15000 On and Off	5-3
Resetting the Versalar 15000	5-5
Muting an Alarm	5-6
Removing Flash or Option Memory Cards from the SSP Card	5-7
Installing Flash or Option Memory Cards in the SSP Card	5-9
Protecting Memory Card Files	5-10

Verifying a Successful Installation

After connecting the Versalar 15000 to the network, you can verify a successful installation by checking the LEDs on the processor and interface cards.

When you turn on the Versalar 15000, the following sequence of processor and interface card LEDs should occur:

1. The power LEDs light green when the Versalar 15000 is turned on.
2. As the diagnostic procedure tests each card, the status LED representing that card slowly flashes green.
3. After the diagnostic testing procedure completes, the boot process begins. The run LEDs flash green while each card is booting.
4. After the boot process completes, the run LEDs stay green, indicating that the cards are operational.

If the LEDs on the cards light in this sequence, your installation is successful. Contact your network administrator to verify that the Versalar 15000 is now connected to the network.

If the LEDs do not light in this sequence, contact your local Nortel Networks Technical Solutions Center.

Turning the Versalar 15000 On and Off

The following instructions are for a Versalar 15000 with a DC power source and for a Versalar 15000 with the AC power unit installed.

Turning the Versalar 15000 with a DC Power Source On and Off

To turn on and off the Versalar 15000 with a DC power source:

1. **Verify that a power module is installed in the left power module slot as you face the front of the Versalar 15000.**
2. **If the Versalar 15000 is connected to the DC power source, make sure that the circuit breaker in the rear of the chassis is in the on (1) position. If the Versalar 15000 has two power modules, make sure that both circuit breakers are in the on position.**
3. **Press the power switch to the on (1) position (Figure 5-1). Do not remove the bezel to turn the switch on. You can access the switch with the bezel on.**

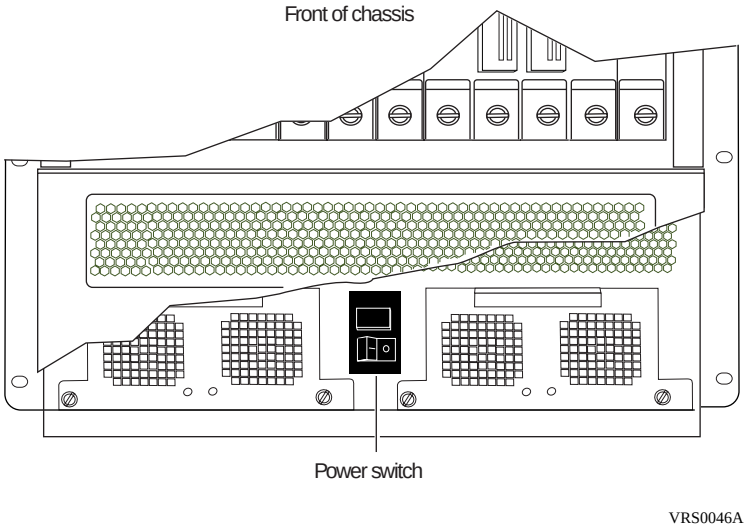


Figure 5-1. Versalar 15000 Power Switch

4. **Verify that the power output LED for each power module lights green.**

   The LED on the DC power module is labeled DC Out OK. If the LED is not on, replace the power module (see “Removing and Installing a Power Filler Plate” on page 3-7).

5. **Verify that air is flowing from the cooling fans out through the top of the Versalar 15000.**

If you cannot feel air flow from the Versalar 15000 vents, or if the power output LED remains off, do the following:

1. **Turn the power switch on the front of the Versalar 15000 to the off (0) position.**
2. **For a DC system, verify that the circuit breakers at the back of the system are on.**
3. **Wait 1 minute and then turn the power switch to the on (1) position.**

If the problem persists, contact the Nortel Networks Technical Solutions Center.

After you turn on the Versalar 15000, each processor and interface card automatically initiates a diagnostic test to verify proper card function.

To turn off the Versalar 15000, press the power switch to the off (0) position.

Turning the Versalar 15000 with the AC Power Unit On and Off

To turn on and turn off the Versalar 15000 with the separate AC power unit:

1. **Verify that one or two AC power modules are installed in the power unit beneath the Versalar 15000.**
2. **Make sure that the circuit breakers labeled AC POWER A and AC POWER B in the front of the power unit are in the on (1) position.**
3. **To complete this procedure, see “Turning the Versalar 15000 with a DC Power Source On and Off” on page 5-3. Follow the steps from step 3 to the end of the section.**

Resetting the Versalar 15000

Figure 5-2 shows the location of the Reset switch.

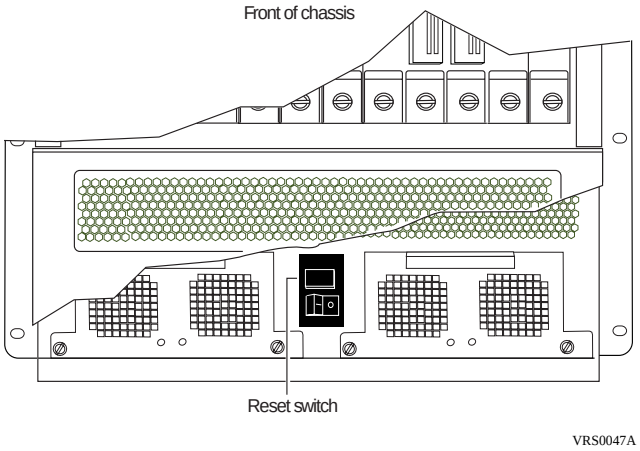


Figure 5-2. Versalar 15000 Reset Switch

You can use the Reset switch to reboot the Versalar 15000 hardware without cycling power. To *warm-start* the Versalar 15000 (no diagnostic tests run), press the Reset switch for less than 5 seconds.

Muting an Alarm

An alarm mute button is located on the SSP interface Ethernet card and the SSP interface console card. Figure 5-3 shows the location of the alarm mute button on the SSP interface console card.

Pressing the alarm mute button disables the external visible or audible alarm. Pressing the button after disabling it has no effect. To re-enable the alarm after muting it, you must use system console software intervention.

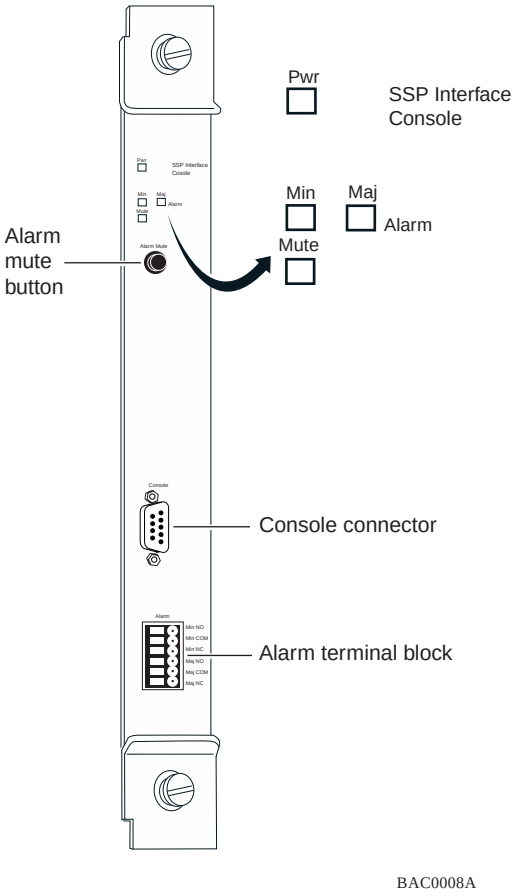


Figure 5-3. Alarm Mute Button

Removing Flash or Option Memory Cards from the SSP Card

To remove flash or option memory cards from the SSP card:

1. **Remove the memory card access cover by squeezing the sides of the cover at the top and bottom (Figure 5-4).**

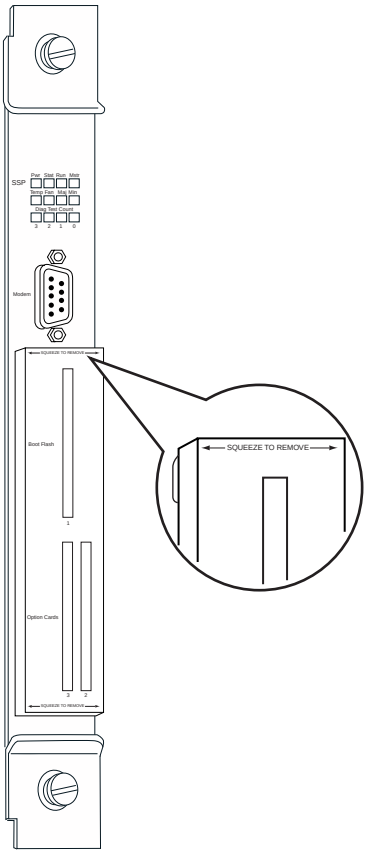


Figure 5-4. Removing the Memory Card Access Cover

2. **Press the eject button above the memory card receptacle on the SSP card (Figure 5-5).**

   The card pops out slightly.

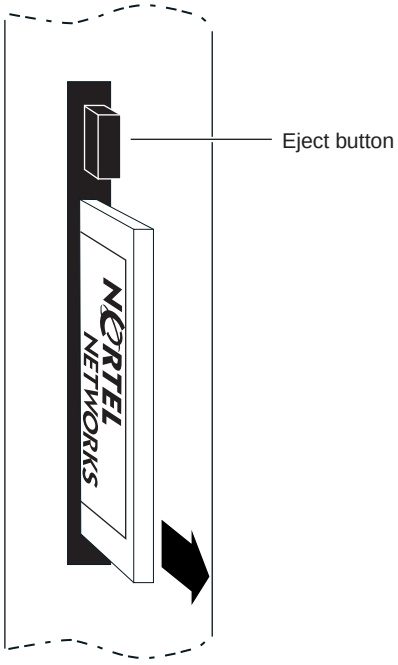


Figure 5-5. Removing a Flash or Option Memory Card

3. **Pull the memory card out of the card receptacle.**
4. **Install the memory card access cover by inserting the cover tabs in the chassis slots.**

Installing Flash or Option Memory Cards in the SSP Card

To install a flash or option memory card in an SSP card:

1. **Remove the memory card access cover by squeezing the sides of the cover at the top and bottom (Figure 5-4 on page 5-7).**
2. **Position the card with the label facing to the left and the insert arrow pointing toward the card receptacle (Figure 5-6).**
3. **Insert the card into the card receptacle.**

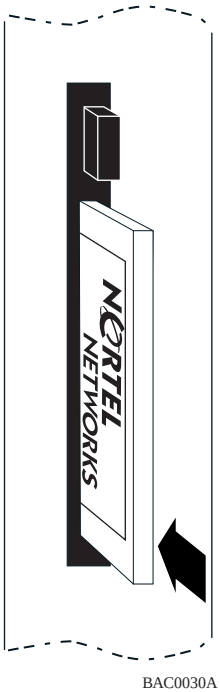


Figure 5-6. Inserting a Flash or Option Memory Card

4. **Gently push the card in until it fits snugly in place.**

   If the memory card is new and you did not obtain it from Nortel Networks, you must format the card before attempting to write to it. See *Managing and Troubleshooting Carrier Networking Services* for instructions.

5. **Install the memory card access cover.**

Protecting Memory Card Files

Nortel Networks ships each memory card with its read-write protect switch in the unprotected position. After successfully loading the configuration file and saving your configuration, you might want to write-protect the memory card for backup purposes.

Note: You typically do not operate a Versalar 15000 with a write-protected memory card. You should make a copy of your configuration on another memory card, write-protect that card, and store it in a safe place.

To change memory card protection:

1. **Remove the memory card access cover by squeezing the sides of the cover at the top and bottom (Figure 5-4 on page 5-7).**
2. **Remove the memory card from the Versalar 15000:**
   a. **Press the eject button above the memory card receptacle (Figure 5-5 on page 5-8).**
   b. **Pull the card out of the card receptacle.**

Caution: You must remove the card from the Versalar 15000 before changing the read-write protection. Failure to remove the card may result in improper write protection.

3. **Locate the read-write protect switch on the edge opposite the arrow on the memory card (Figure 5-7).**

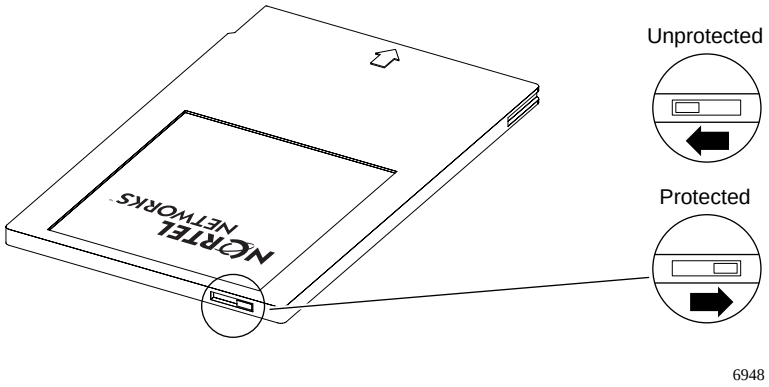


Figure 5-7. Memory Card Read-Write Protect Switch

4. **Adjust the read-write protect switch.**
5. **Reinsert the memory card into the card receptacle (Figure 5-6 on page 5-9):**
   a. **Position the card with the label facing to the left and the insert arrow pointing toward the card receptacle.**
   b. **Insert the card into the card receptacle.**
   c. **Gently push the card in until it fits snugly in place.**

Appendix A
Technical Specifications

This appendix provides physical, electrical, and environmental specifications for the Versalar 15000, descriptions of the interface options, and specifications for the OC-12c/STM-4c ATM and DS3 interface cards.

Physical, Electrical, and Environmental Specifications

The physical dimensions and weight of the Versalar 15000 with fan tray and two power supplies are as follows:

- Height: 22.75 in. (75.56 cm)
- Width: 17.25 in. (43.81 cm)
- Depth: 20.2 in. (51.30 cm)
- Weight: 110 lb (41.03 kg)

The Versalar 15000 DC power supply supports:

- -48/-60 VDC nominal input voltage
- 40 A maximum output current under full load at -41.75 VDC input
- AWG #4 (AWG #2 recommended) wires from the power source

The environmental requirements of the Versalar 15000 are as follows:

- Altitude: 0 to 10,000 ft (0 to 3048 m)
- Humidity: 5% to 85%, noncondensing
- Temperature: 41°F to 104°F (5°C to 40°C), stable

Hardware Communications Options

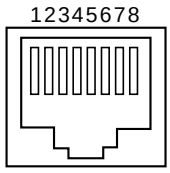
The Versalar 15000 supports the following network interfaces:

- One Ethernet 10/100BASE-T interface
- Local console interface
- Service modem interface

Ethernet 10/100BASE-T Interface

The Ethernet 10/100BASE-T interface on the SSP interface Ethernet card provides UTP support for LAN connectivity. Table A-1 identifies the pin locations and function assignments for this interface.

Table A-1. 10/100BASE-T Interface Pin Assignments

Pin Assignment	Pin No.	Standard Interface Signal (Function)
	1	TX+ (transmit to UTP)
	2	TX- (transmit to UTP)
	3	RX+ (receive from UTP)
	4	Not used
	5	Not used
	6	RX- (receive from UTP)
	7	Not used
	8	Not used

Local Console Interface

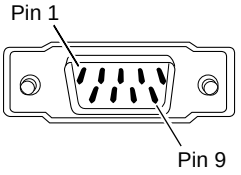
The SSP interface console card contains one console service interface, labeled Console; its DB-9 plug connector provides an RS-232-D serial connection. You use this local console port to connect the Versalar 15000 to any VT-100-compatible console device for direct console access.

The Versalar 15000 shipping package includes a console/modem cable and null modem adapter for connecting devices to the console port.

- To connect a terminal to the console port, use the console/modem cable with the null modem adapter.
- To connect an IBM compatible PC to the console port, use the console/modem cable and the null modem adapter plus a standard AT serial cable with one DB-25 plug connector, supplied with the PC.

Table A-2 identifies the signal and pin assignments for the console port.

Table A-2. Local Console Port DB-9 Pin Assignments

Pin Assignment	Pin No.	Signal Name	To Signal
	1	Not used	Not used
	2	TX	RX
	3	RX	TX
	4	Not used	Not used
	5	Ground (GND)	GND
	6	Not used	Not used
	7	Not used	Not used
	8	Not used	Not used
	9	Not used	Not used

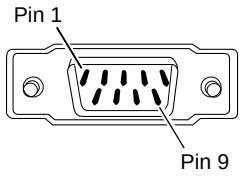
Service Modem Interface

The SSP card has one modem service interface, labeled Modem; its DB-9 plug connector provides an RS-232-D serial connection. You use this local modem port to connect the Versalar 15000 to any Hayes-compatible modem for remote dial-in access.

The Versalar 15000 shipping package includes the console/modem cable for connecting devices to the modem port. To connect a modem, use the cable and a standard 15-foot molded AT serial cable with DB-9 receptacle to DB-25 plug connectors.

Table A-3 identifies the signal and pin assignments for the modem port.

Table A-3. Service Modem Port DB-9 Pin Assignments

Pin Assignment	Pin No.	Signal Name	To Signal
	1	DCD (data carrier detect)	DCD
	2	TXD (transmit data)	RXD
	3	RXD (receive data)	TXD
	4	DSR (data set ready)	DTR
	5	GND	GND
	6	DTR (data terminal ready)	DSR
	7	CTS (clear to send)	RTS
	8	RTS (request to send)	CTS
	9	Not used	N/A

OC-12c/STM-4c ATM Interface Card Specifications

The OC-12c/STM-4c ATM interface card provides the Versalar 15000 with a 622 Mb/s ATM interface. This connection is concatenated, which provides for increased efficiency by eliminating the need to partition the bandwidth.

Each OC-12c/STM-4c ATM interface card incorporates the following primary components:

- Reassembly

  The transceivers support packet reassembly (converting ATM cells to packets). The transceivers can handle up to 4000 simultaneous reassemblies (based on an average packet size of 280 bytes). In addition, the reassembly application-specific integrated circuit (ASIC) supports up to 15,000 active virtual circuits.

- Segmentation

  The transceivers also support segmentation (converting packets to ATM cells). The segmentation ASIC supports up to 15,000 active virtual circuits.

Fiber optic transmission defines two types of fiber: single-mode and multimode. Signals can travel farther through single-mode fiber than through multimode fiber. The maximum distance for single-mode installations is determined by the amount of light loss in the fiber path. See Table A-4 for details on transmission distances and power budgets for single-mode and multimode fiber optic lines.

Table A-4. Maximum Fiber Optic Power Budget and Transmission Distances

Transceiver Type	Power Budget	Transmit Power	Receive Power	Maximum Distance Between Stations
Single-mode*	13 dB	-15 to -8 dBm at 1261 to 1360 nm†	-28 to -8 dBm	Up to 9.3 miles (15 km)
Multimode	11 dB	-19 to -14 dBm at 1270 to 1380 nm	-30 to -14 dBm	Up to 1.2 miles (2 km)

* Complies with Bellcore GR-253 Intermediate Reach Specification
† nm = nanometers

DS3 Interface Card Specifications

The DS3 port adapter's T3 port is designed to receive and transmit at the DSX-3 level while driving and receiving from a 75-ohm coaxial cable (ATT 728A type coax). The T3 port connects directly to any equipment with DSX-3 level BNC connectors. Table A-5 lists the specifications for the DS3 interface.

Table A-5. Specifications for the DS3 Interface

Parameter	Specification
Line rate	44.736 Mb/s (20 ppm)
Line code	B3ZS (bipolar with three-zero substitution)
Impedance	75 ohms
Pulse shape	ANSI T1.102, pulse amplitude between 0.36 and 0.85 V peak
Input signal	DSX-3 (9.7 dB to -11.8 dB)
Output signal	DSX-3, able to drive 450 ft (135 m) of 75-ohm coaxial cable (728 A or equivalent) and meet pulse shape template at the line side

Versalar 15000 Card Glossary

Access Interface Card

Supports network layer processing for access processor (AP) cards. In the Versalar 15000, it occupies slots 1 to 5 in the back of the chassis and includes:

- Hex T3 (T3) cards
- Access redundancy module (ARM) cards
- Dual OC-3 (single-mode and multimode) for CAP

Access Processor (AP) Card

Provides layer 2 processing. The Versalar 15000 supports five AP cards in the front of the chassis in slots 1 to 5. Each AP card services the access interface card corresponding to the slot number of the installed AP card. For example, the AP card installed in processor card slot 2 services the access interface card installed in interface card slot 2.

In the Versalar 15000, AP cards include:

- M13 CAP card
- M13/DS3 CAP card
- DS3 CAP card
- ATM access processor card

Access Redundancy Module (ARM)

Allows failover to a similar redundant AP card as long as an ARM card is installed in slot 5 in the back of the Versalar 15000 chassis.

Alarm Mute Button

Identifies the button located on the system services processor (SSP) interface Ethernet or SSP interface console card that disables the external visible or audible alarm.

Alarm Terminal Block

Identifies the module located on the SSP interface Ethernet or SSP interface console card that permits a connection to an alarm. The major and minor alarms provide connection to normally open (NO) and normally closed (NC) relay contacts. When the Versalar 15000 logs certain fault event messages, such as component failure, loss of power, or loss of signal, the alarm relay activates an external visible or audible alarm.

ATM Trunk Processor (ATP) Card

Provides an ATM optical link-level interface, constant bit rate (CBR) service, variable bit rate (VBR) service and unspecified bit rate (UBR) service. The Versalar 15000 can support two ATP cards in slots 11 and 12 in the front of the chassis.

Channelized Access Processor (CAP) Card

Identifies a certain type of processor card. The Versalar 15000 supports three kinds of CAP cards:

- M13 CAP card -- used for subrate T1 and T1 applications.
- M13/DS3 CAP card -- provides both T1 and high-speed access.
- DS3 CAP card -- provides high-speed access over DS3 lines.

Ethernet 10/100 Mb Connector

Identifies the connector located on the SSP interface Ethernet card that supports a 10/100 Mb Ethernet interface.

Flash Memory Card Slot

Identifies the slot located on the SSP card that permits the installation of flash memory cards.

Hex T3 (T3) Interface Card

Provides physical line interfaces for six T3 lines. The Versalar 15000 supports up to five T3 interface cards in slots 1 to 5 in the back of the chassis.

Interface Card

Provides the link to the network by collecting data from the network, creating frames, packets, or cells, and sending them to the processor cards for routing. Also known as a PHY card, it receives data from the processor cards and sends it to the network.

Interface Filler Card

Identifies the card located in each empty interface card slot in the Versalar 15000. It directs cool air to the adjacent interface card. Any time an interface card is removed from the Versalar 15000 without an immediate replacement, an interface filler card must be installed.

Internet Forwarding Processor (IFP) Card

Provides layer 3 switching for the Versalar 15000. The Versalar 15000 can support three IFP cards in the front of the unit in chassis slots 6 to 8.

Modem Connector

Identifies the connector on the SSP card that allows a modem connection for remote dial-in access to the Bay Command Console (BCC). The modem provides the same functions as a locally attached console.

Multimode

Identifies a type of fiber optic transmission. Signals can travel farther through single-mode fiber than through multimode fiber. The Versalar 15000 supports several types of cards, among them OC-3c and OC-12c, that come in both single-mode and multimode fiber.

Nonredundant Configuration

Does not allow failover to a redundant AP card since there is no access redundancy module (ARM) installed in slot 5. In such configurations, slot 5 is either not populated or has an interface card installed.

Option Card Slot

Identifies the 2-slot PCMCIA located on the SSP card that permits the installation of option cards.

Processor Card

Occupies slots 1 to 12 in the front of the Versalar 15000 and includes the following types of cards:

- AP cards
- IFP cards
- SSP cards
- TP cards

Typically, the SSP cards provide system control, the AP and TP cards provide network layer protocol processing on data packets, and the IFP cards operate as protocol forwarding engines.

Processor Filler Card

Identifies the card located in each empty processor card slot in the Versalar 15000. It directs cool air to the adjacent processor card. Any time a processor card is removed from the Versalar 15000 without an immediate replacement, a processor filler card must be installed.

Redundant Configuration

Allows failover to a redundant AP card as long as an ARM card is installed in slot 5 in the back of the Versalar 15000 chassis.

Single-Mode

Identifies a type of fiber optic transmission that is capable of higher bandwidth and greater cable run distances than multimode fiber. The Versalar 15000 supports several types of cards, among them OC-3c and OC-12c, that come in both single-mode and multimode fiber.

System Services Processor (SSP) Card

Acts as the central processing resource (CPR) on which the network layer protocols run. SSP cards are responsible for Versalar 15000 route determination, statistics, and central management. The Versalar 15000 can support two SSP cards in slots 9 and 10 in the front of the unit.

SSP Interface Card

Provides dedicated interfaces for out-of-band management, as well as system-wide status. The SSP interface cards are the SSP interface console card and the SSP interface Ethernet card. In the Versalar 15000, they occupy slots 9 and 10 in the back of the chassis.

SSP Interface Console Card	Occupies slot 10 in the back of the chassis.
SSP Interface Ethernet Card	Supports the 10/100 Mb Ethernet interface. It occupies slot 9 in the back of the chassis.
Trunk Interface Card	Supports network interfaces for trunk processor (TP) cards. It occupies chassis slots 11 and 12 in the back of the chassis.

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